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FEDERAL MARITIME NAVIGATION PROGRAMS: INTERAGENCY COOPERATION AND TECHNOLOGICAL CHANGE

(114–51)

JOINT HEARING

BEFORE THE

SUBCOMMITTEE ON
COAST GUARD AND MARITIME TRANSPORTATION

AND THE

SUBCOMMITTEE ON
WATER RESOURCES AND ENVIRONMENT

OF THE

COMMITTEE ON
TRANSPORTATION AND
INFRASTRUCTURE
HOUSE OF REPRESENTATIVES

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CONTENTS

Page

Summary of Subject Matter vi

WITNESSES

Rear Admiral Paul F. Thomas, Assistant Commandant for Prevention Policy, U.S. Coast Guard:
- Testimony 9
- Prepared statement 38
- Responses to questions for the record from the following Representatives:
  - Hon. John Garamendi of California 43
  - Hon. Todd Rokita of Indiana 47

Rear Admiral Shepard M. Smith, Director, Office of Coast Survey, National Ocean Service, National Oceanic and Atmospheric Administration:
- Testimony 9
- Prepared statement 49
- Responses to questions for the record from Hon. John Garamendi, a Representative in Congress from the State of California 59

Edward E. Belk, Jr., P.E., Chief, Operations and Regulatory Division, U.S. Army Corps of Engineers:
- Testimony 9
- Prepared statement 61

PREPARED STATEMENTS SUBMITTED BY MEMBERS OF CONGRESS

Hon. Peter A. DeFazio of Oregon 32

Hon. John Garamendi of California 35

SUBMISSIONS FOR THE RECORD

Hon. Grace F. Napolitano, a Representative in Congress from the State of California, request to submit the following:
- Letters of opposition to the Vessel Incidental Discharge Act [1]
- Letter of September 7, 2016, from Hon. Grace F. Napolitano, Ranking Member, Subcommittee on Water Resources and Environment, to Hon. Bill Shuster, Chairman, Committee on Transportation and Infrastructure 7

Rear Admiral Paul F. Thomas, Assistant Commandant for Prevention Policy, U.S. Coast Guard, response to request for information from Hon. John Garamendi, a Representative in Congress from the State of California 30

ADDITIONS TO THE RECORD

Written statement of Edward Saade, President, Fugro (USA) Inc. 66

[1] The letters referenced by Congresswoman Napolitano are available online at GPO's Federal Digital System (FDsys) at https://www.gpo.gov/fdsys/pkg/CPRT-114HPRT23997/pdf/CPRT-114HPRT23997.pdf.

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September 2, 2016

SUMMARY OF SUBJECT MATTER

TO:	Members, Subcommittees on Coast Guard and Maritime Transportation and Water Resources and Environment
FROM:	Staff, Subcommittees on Coast Guard and Maritime Transportation and Water Resources and Environment
RE:	Joint Hearing on "Federal Maritime Navigation Programs: Interagency Cooperation and Technological Change"

PURPOSE

The Subcommittees on Coast Guard and Maritime Transportation and Water Resources and Environment will hold a joint hearing on Wednesday, September 7, 2016, at 10:00 a.m., in 2167 Rayburn House Office Building to examine federal maritime navigation programs. The Subcommittees will hear from the United States Coast Guard, the United States Army Corps of Engineers (Corps), and the National Oceanic and Atmospheric Administration (NOAA).

BACKGROUND

A safe, secure, and efficient marine transportation system is critical to the U.S. economy. According to the Maritime Administration, waterborne cargo and associated commercial activities contribute more than $649 billion annually to the U.S. gross domestic product and sustain more than 13 million jobs. Nearly 100 percent of the volume of overseas trade enters or leaves the United States by vessels navigating the marine transportation system. The National Marine Manufacturers Association reports the 12 million registered recreational boats in the United States generate an annual economic value of $121.5 billion and support 964,000 direct and indirect American jobs. To facilitate the efficient movement of goods and commodities, protect the environment, and ensure the safety and security of the marine transportation system, the navigable waters of the United States are charted, marked, and maintained to assist in vessel navigation. The Coast Guard, the Corps, and NOAA each play integral roles in operating and maintaining different features of the U.S. navigation system.

A major challenge facing the Nation is to improve the economic efficiency and competitiveness of the U.S. maritime sector, while reducing risks to life, property, and the coastal environment. The emergence of satellite and advanced telecommunication based

navigation technologies presents new opportunities to improve the safety, security, and efficiency of the marine transportation system and reduce risks to the coastal and maritime environments. Operational integration of these new and emerging electronic navigation (e-navigation) technologies also poses challenges for federal and other governmental agencies, and for private commercial vessel operators and recreational boaters.

NOAA

NOAA's National Ocean Service (NOS), specifically its Office of Coast Survey (Coast Survey), conducts hydrographic surveys which measure the depths and bottom configurations of water bodies. This survey data is subsequently translated by NOAA into nautical charts which are managed and published by NOAA for use by commercial and recreational vessel owners. The Coast Survey collects hydrographic survey data from a variety of sources, including NOAA's own fleet of hydrographic survey vessels, contracted private sector hydrographic survey firms, and from other federal navigation partners, such as the Corps. The hydrographic survey data the Coast Survey gathers is used to generate over 1,000 nautical charts covering 95,000 miles of shoreline and 3.4 million square nautical miles of waters within the U.S. Exclusive Economic Zone.

Nautical charts provide information to mariners on channel depths and configurations, natural and manmade obstructions to navigation, regulated navigation areas, security zones, and other information critical to safe navigation. The Coast Survey makes nautical charts available in several formats, including traditional paper charts and as downloadable data for incorporation into electronic chart systems. Effective April 13, 2014, the Coast Survey no longer publishes charts, but does make "print-on-demand" charts available to the public on its website (FR 2013–31378).

Since conditions on the water change constantly, the Coast Survey may update its collection of nautical charts 200 to 300 times a year. In addition to issuing updated chart information, the Coast Survey forwards the information about changes to its nautical charts to the Coast Guard for broadcast and publication in the Service's *Local Notice to Mariners.* This ensures mariners have the latest information about conditions on the water. In addition, on February 3, 2016, the Coast Guard published Navigation and Vessel Inspection Circular No. 01-16 to now accept the use of an Electronic Charting System (ECS) to satisfy the nautical chart carriage requirement in §33 CFR 164.33 for domestic U.S. vessels who wish to voluntarily elect to use electronic charts instead of paper charts.

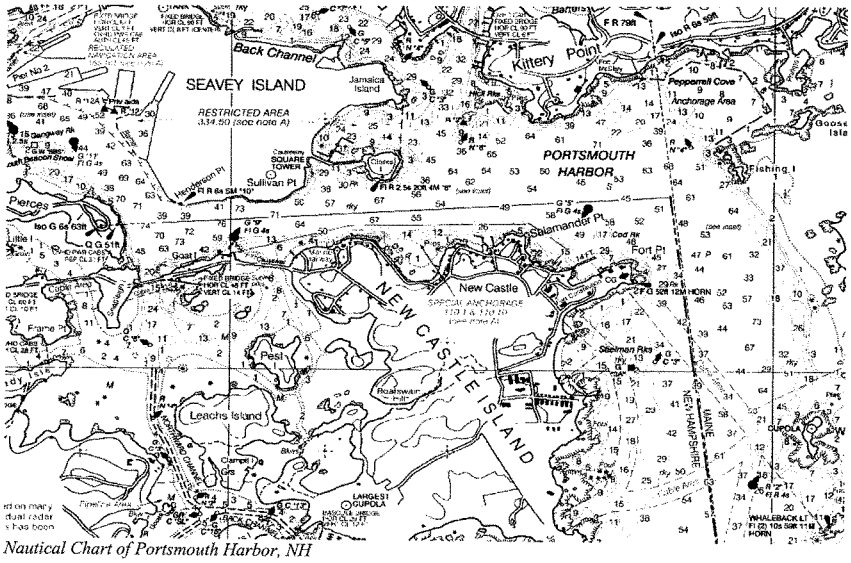
Two other NOS programs also provide important physical data and products that help inform and improve the accuracy and utility of NOAA's nautical charts:

- The National Geodetic Survey (NGS) - develops and maintains the National Spatial Reference System (NSRS), a national coordinate system that provides the foundation for transportation, navigation, land record systems, mapping and charting efforts, and a multitude of scientific and engineering applications. The NSRS system defines position (latitude, longitude, and elevation), distances, and direction bearings between points which are critical to navigation. Additionally, NGS implements a shoreline mapping

program to define the national shoreline and other coastal features needed for updating nautical charts and providing visual aids to mariners.

- The Center for Operational Oceanographic Products and Services (CO-OPS) – gathers tide information along the Nation's coasts, to enable reliable prediction, and the publication of daily, monthly, and seasonal tidal cycles for maritime users. Moreover, CO-OPS's technicians, scientists, and engineers collect real-time water level, current, and other oceanographic observations and monitoring data (such as tsunami warning data) that support safe and efficient maritime commerce and help to protect life, property, and the environment. A good example of a CO-OPS product is the Physical Ocean Real Time System (PORTS), a decision support tool that measures and disseminates observations and predictions of water levels, currents, salinity, and meteorological parameters (e.g., winds, atmospheric pressure, air and water temperatures) that mariners need to safely access into and egress from major U.S. ports.

In fiscal year 2016, NOAA spent over $205 million on hydrographic surveys and other navigation related activities.



Nautical Chart of Portsmouth Harbor, NH

Corps

The Corps' navigation mission is to provide a safe, reliable, efficient, effective, and environmentally sustainable waterborne transportation system for movement of commerce, national security needs, and recreation. The Corps is responsible for dredging and maintaining

the depth of nearly 25,000 miles of federal navigation channels throughout the country. The Corps also dredges 926 coastal, Great Lakes, and inland harbors. In addition to dredging channels, anchorages, and turning basins, the Corps operates and maintains 239 lock chambers at sites on the inland river system and is responsible for thousands of protective jetties and breakwaters throughout the country.

While NOAA conducts much of the hydrographic surveys of U.S. waters, the Corps is responsible for hydrographic surveys of all federal navigation channels, as well as the entire inland river system. The Corps uses its fleet of over 95 hydrographic survey vessels, as well as contracted private sector vessels to ascertain the depth and condition of federal channels on a regular basis. Hydrographic surveys are also conducted in conjunction with maintenance dredging activities to ensure federal navigation channels are dredged to approved depths. The Corps forwards the data from these surveys to NOAA for inclusion on NOAA's nautical charts.

In fiscal year 2016, the Corps was provided more than $2.6 billion for the construction, operation, and maintenance of the Nation's inland and coastal navigation systems. This includes new and ongoing construction of coastal channels and inland locks, maintenance of existing channels, the operation and maintenance of locks and associated navigation infrastructure, and hydrographic surveys. Of that amount, the fiscal year 2016 appropriations provided more than $1.2 billion from the Harbor Maintenance Trust Fund, for maintenance of the Nation's coastal and inland harbors, which is the same level provided in the *Water Resources Reform and Development Act of 2014* for these activities; however, even with this appropriation, the Corps continues to face a backlog of unmet harbor maintenance needs at high-use, moderate-use, and emerging harbors, despite the fact that, at the end of fiscal year 2017, the Harbor Maintenance Trust Fund is forecast to have a surplus of $9.8 billion.

Coast Guard

The Coast Guard is responsible for providing a safe, secure, and efficient navigation system to support domestic commerce, international trade, and military sealift requirements for national defense. To carry out these responsibilities, the Service conducts numerous port and waterways management tasks. These tasks include, maintaining physical aids-to-navigation (ATON), developing navigation standards and regulations, operating vessel traffic services, conducting icebreaking, permitting bridges over navigable waters, and the operation, implementation, and coordination of several electronic navigation and vessel tracking and identification technologies.

ATON Mission

The Coast Guard maintains a system of over 47,000 federal government-owned lighted and unlighted buoys, beacons, and other ATON that mark 25,000 miles of waterways and navigable coastal waters. The Service also oversees an additional 50,000 private ATONs. The Coast Guard's 64 Aids-to-Navigation Teams rely on a fleet of 68 buoy tenders and 152 small boats to service its ATON system. The Coast Guard uses hydrographic survey data from the Corps and NOAA to help determine where ATONs should be positioned. In fiscal year 2016, the Coast Guard was appropriated $1.37 billion to carry out its ATON mission.

E-Navigation

The Coast Guard's Navigation Center (NAVCEN) in Alexandria, Virginia is responsible for the collection, integration, dissemination, presentation, and analysis of maritime information by electronic means to enhance maritime navigation and support Maritime Domain Awareness. NAVCEN manages the several e-navigation systems for the federal government including:

- Automatic Identification System (AIS) - AIS is a Very High Frequency (VHF)-based, short-range communication system that provides a means for vessels to electronically exchange data, including identification, position, course, and speed, with other nearby vessels and shore-based AIS receivers. Depending on signal strength, weather, geography, and receiver capability, AIS signals can generally be received up to 50 miles away.

  AIS data is overlaid on electronic charts to provide vessel operators with near real-time information on vessel position, course, and speed. The Coast Guard is currently testing AIS to transmit information to vessel operators indicating where it has imposed temporary restricted areas and where ATON outages exist. The Service plans to augment its physical ATONs with electronic ATONs and reduce where possible the number of physical ATONs that require regular or seasonal maintenance.

- Nationwide Automatic Identification System (NAIS) - The Coast Guard collects AIS signal data through its NAIS. NAIS consists of approximately 200 VHF receiver sites located along the coasts and inland river systems of the United States. NAIS allows the Coast Guard to collect data from AIS-equipped vessels traveling in the vicinity of the Nation's 58 largest ports.

- Long Range Identification and Tracking (LRIT) - LRIT is a worldwide, satellite-based automated tracking system for vessels on international voyages with 12 or more passengers, or over 300 gross tons. Unlike AIS, LRIT is a secure system in which vessel identity and position data is transmitted every six hours to data centers that distribute them to countries permitted to have the information. This system allows certain governments, such as the United States, access to flag, port, and coastal state LRIT information.

- Differential Global Positioning System (DGPS) – DGPS transmitters augment traditional GPS satellite signals to improve accuracy so that it can be relied upon for navigation. DGPS sites provide signal coverage to 92 percent of the continental United States, complete coverage of the coastline, as well as selected portions of Alaska, Hawaii, Puerto Rico, and the inland river system. In August 2015, the Coast Guard issued a notice proposing to shut down and decommission 62 of then-existing 84 Nationwide DGPS sites. By August 2016, 37 Nationwide DGPS sites had been disestablished, nine of which are Coast Guard maritime sites and 28 are Department of Transportation (DOT) inland sites. Going forward a total of 46 Coast Guard and Corps sites will continue to be available to users in major maritime ports and waterways (FR 2016-15816).

Enhanced Long Range Aids to Navigation (eLORAN)

Electronic navigation systems like AIS rely heavily on the DGPS/GPS system to provide the positioning, navigation, and timing (PNT) data necessary to properly function. However, GPS satellite signals are often subject to interference from space weather such as solar flares, as well as spectrum encroachment from radio emissions, and intentional and unintentional acts of GPS frequency jamming. When disruptions occur in GPS satellite PNT signals, mariners are currently left to rely on physical ATONs to safely navigate.

In 2004, President George W. Bush issued a National Security Presidential Directive that tasked the DOT to work with the Department of Homeland Security (DHS) to develop backup capabilities to mitigate disruptions to GPS signals (National Security Presidential Directive 39). In 2008, DHS proposed to upgrade the Coast Guard's antiquated Long Range Aids to Navigation (LORAN) system with an eLORAN system to act as a primary backup to GPS. eLORAN is a low frequency radio-based system capable of providing position, navigation, and timing information to users at levels of accuracy similar to GPS. Funding was not appropriated to begin the transition to eLORAN. In 2009, DHS announced plans to decommission LORAN and no longer sought funds to upgrade the system to eLORAN. In 2010, the Coast Guard terminated LORAN transmissions.

The *Coast Guard Authorization Act of 2010* (P.L. 111-281) required the Secretary of DHS to study and determine if a backup system to GPS is necessary. The Secretary concluded further study is required (*An Analysis of Whether a Single Domestic Backup Navigation System is Needed for GPS: Report to Congress. September 2011*). In November 2013, the Government Accountability Office released a report finding that DOT and DHS had made limited progress in developing a backup for GPS and faulted both departments for failing to better collaborate on the issue (GAO-14-15). Section 229 of the *Howard Coble Coast Guard and Maritime Transportation Act of 2014* (P.L. 113-281) prohibits the Coast Guard from dismantling or disposing of infrastructure that supported former LORAN, unless the DHS Secretary determines and reports to Congress that LORAN infrastructure is not needed to provide redundant capability for GPS.

WITNESSES

Rear Admiral Paul F. Thomas
Assistant Commandant for Prevention Policy
United States Coast Guard

Rear Admiral Shephard Smith
Director, Office of Coast Survey
National Oceanic and Atmospheric Administration

Mr. Edward E. Belk, Jr. P.E.
Chief, Operations and Regulatory Division
United States Army Corps of Engineers

FEDERAL MARITIME NAVIGATION PROGRAMS: INTERAGENCY COOPERATION AND TECHNOLOGICAL CHANGE

WEDNESDAY, SEPTEMBER 7, 2016

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION,JOINT WITH THE SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT,
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,
Washington, DC.

The subcommittees met, pursuant to notice, at 10:05 a.m. in room 2167, Rayburn House Office Building, Hon. Bob Gibbs (Chairman of the Subcommittee on Water Resources and Environment) presiding.

Mr. HUNTER. The subcommittees will come to order. The Coast Guard and Maritime Transportation and the Water Resources and Environment Subcommittees are jointly meeting today to review the Federal Government's navigation programs.

From the earliest days of the United States, the Federal Government took responsibility for activities necessary to promote international and interstate trade, including activities that promote safe and efficient maritime navigation. Navigation activities of the Coast Guard, the Army Corps of Engineers, and the National Oceanic and Atmospheric Administration provide for a safe, secure, and efficient Marine Transportation System that forms the backbone of our economy. The maritime sector contributes more than $650 billion annually to the U.S. gross domestic product and sustains more than 13 million jobs. Nearly 100 percent of our overseas trade enters or leaves the United States by vessels navigating the Marine Transportation System.

To maintain this economic output, facilitate the efficient movement of goods, protect the environment, and ensure the safety and security of Marine Transportation Systems, the navigable waters of the United States are charted, marked, and dredged on a regular basis. NOAA is tasked with surveying and producing over 1,000 nautical charts covering 95,000 miles of shoreline and 3.4 million square nautical miles of waters; the Corps is responsible for surveying and maintaining the depth of nearly 25,000 miles of Federal navigation channels throughout the country; and the Coast Guard is charged with the maintenance of over 47,000 Federal Government-owned buoys, beacons, and other aids to navigation that mark 25,000 miles of waterways. That is a lot.

It has been 2 years since the last hearing on this topic. I am interested in hearing from the agencies on progress made to carry out these missions in a coordinated, cost-effective manner, while also ensuring the safety, security, and efficiency of our waterways and taking advantage of ongoing technological advances. The agencies held 12 joint public listening sessions in 2014 to better understand the needs of the user groups, and I look forward to the agencies updating the subcommittees on what they heard from user groups and how the agencies went forward or will go forward to meet the user needs.

In an age of electronic communications and digital technology, I am interested to understand if the agencies have been able to keep up with technological improvements and the way in which charting data is collected and displayed. Is the private sector able to use the data to develop their own products to assist mariners, and are Federal actions assisting these endeavors? Are Federal regulations supportive or do they impede the move to a digital world? And as we move toward the use of more e-navigation systems, are adequate redundancies and backup systems like e-loran available to ensure safety?

In order to grow jobs and remain competitive in a global economy, we must build and maintain a reliable, world-class navigation system. I look forward to hearing from our witnesses on what progress they have made towards making such a system a reality.

And, with that, I am not going to hear about it, I am going to read about it when I read the transcript. The Armed Services Committee is doing a classified overview of the entire Middle East, which I am going to go and hear the ops briefing on and then come back in here and resume.

So, I am going to turn it over right now to Mr. Gibbs, who is going to chair this and who chairs the Water Resources and Environment Subcommittee. With that, I yield to Mr. Gibbs.

Mr. GIBBS. At this time I will yield to the ranking member of the Coast Guard and Maritime Transportation Subcommittee, Mr. Garamendi.

Mr. GARAMENDI. Thank you, Mr. Gibbs, Mr. Chairman. Welcome back to all of us. We have got a busy month out ahead in September, and thank you for scheduling this meeting, particularly with the Subcommittee on Water Resources and Environment.

As we continue our oversight into the future of maritime navigation, the timing of this hearing could not be better. Only last week an article ran in the Wall Street Journal entitled, "Pilotless sailing is on the horizon. Freight carriers aim to optimize the use of vessels, cut their fuel and labor costs." This article revealed that right now ship designers, operators, and regulators are gearing up for a future in which cargo vessels sail the oceans and waterways with minimal or even no crew. And it foresees a day in the not-too-distant futures when technology, long used to improve the commercial airline operations, will migrate to vessels.

Coming less than 2 weeks after the release of the FAA's pioneering rulemaking governing the use of commercial drones, the Wall Street Journal article reinforced in my mind that the dawn of a new age of fully automated or even autonomous transportation systems is upon us. The implications of such a transformation

could signal greatest innovation in maritime transportation since the conversion from steam to diesel-powered propulsion systems, or the advent of containerization.

Yet do we fully grasp the scale and complexity before us? I don't think so. The tremendous size and expense of the newest generation of mega-container ships such as the *Benjamin Franklin*, which can carry up to 18,000 containers, make the financial, commercial, and environmental risks enormous. And for global maritime industry that sustains the reliable and efficient global supply chain that fuels the U.S. economy, failure and accidents could be devastating.

Additionally, this transformation will only increase our reliance on electronic data, virtual aids to navigation, and other network navigation technologies such as radars, chart plotters, gyrocompasses that rely on positioning, navigation, and timing signals provided by GPS. But we do know that GPS is the single point of failure.

The fact of the matter is that the Coast Guard has such identified GPS as the vulnerable—as cybersecurity—therefore, the Coast Guard Commandant, Admiral Zukunft, has said that GPS is the single point of failure in this critical infrastructure. We need to work on that. We've been talking in this committee and others about the problems of the GPS system and the necessity of a backup. I suspect we're going to hear some of that. We're going to learn a great deal.

Thank you for the hearing. I yield back my time.

Mr. GIBBS. Ranking member of the full committee, Mr. DeFazio, do you have an opening statement?

Mr. DEFAZIO. I will just submit one for the record.

Mr. GIBBS. OK, thank you. As chairman of the Water Resources and Environment Subcommittee, I am pleased to be here at this joint hearing with the Coast Guard and Maritime Transportation Subcommittee.

There is no doubt the nexus between the Army Corps of Engineers, the National Oceanic and Atmospheric Administration, and the Coast Guard are vitally important to ensuring the safety and security of our Nation's Marine Transportation System, and ensuring a competitive edge for U.S. goods in overseas markets.

I would also like to thank our witnesses for being here today. We have Mr. Eddie Belk here from the Army Corps of Engineers. He serves as the Chief of the Operations and Regulatory Division. I look forward to hearing his testimony about how the Corps of Engineers collaborates with both NOAA and the Coast Guard.

The Corps of Engineers is responsible for the operation and maintenance of nearly 25,000 miles of Federal navigation channels, which includes both coastal and inland channels. It will be interesting to hear how advanced technologies have played a role in maintaining the authorized widths and depths of these channels, as well as improving the safety for vessels that transit the inland and the coastal systems.

In addition to dredging, the Corps is also responsible for operating and maintaining more than 240 locks at more than 190 sites on the inland water river system. The average age of these facilities is more than 60 years old. In 2014, Congress enacted critical reforms to improve the inland navigation system, both in WRRDA

2014 and a fuel tax increase requested by industry that are intended to recapitalize our aging inland navigation systems. While a large component of the Inland Navigation Trust Fund is dedicated to completing the Olmsted Locks and Dam project, it will be interesting to hear from the Corps as to how they plan on accelerating and prioritizing the other inland navigation projects on the Ohio and Mississippi River systems.

Additionally, the Corps is responsible for operating and maintaining the channels that lead to and from the Nation's large network of coastal ports. At any given time only 35 percent of these channels are at their authorized widths or depths, and we remain concerned the administration's budget requests for these activities fall far short of what is required.

Congress did its part in fiscal year 2016 by providing almost $1.3 billion from the Harbor Maintenance Trust Fund, which meets the suggested targets from WRRDA 2014. While other trust funds have solvency challenges, the Harbor Maintenance Trust Fund is being neglected by this administration. Their annual budget for the Corps of Engineers does not reflect the priorities of the Congress or this Nation.

Given the vast expanse of navigation channels, our advanced technology can help improve navigation safety and advance economic security, but only to a certain point. These technologies need to be coupled with an adequate channel maintenance and recapitalization of antiquated infrastructure to ensure the Nation's competitive edge in the global marketplace.

I now would like to yield——

Mr. GARAMENDI. If I might, Mr. Chairman, I do note that I am also on the Armed Services Committee and that classified briefing is going on, so I am going to excuse myself. My colleagues on our side are going to remain here.

Mr. GIBBS. OK, thank you. I yield to—for any opening statements—to the ranking member of the Subcommittee on Water Resources and Environment, from California, Mrs. Napolitano.

Mrs. NAPOLITANO. Thank you, Mr. Chairman, for recognizing me. I appreciate your calling attention to the importance of this Nation's maritime transportation network.

Our historic investments in commercial harbors, inland waterways, and port infrastructure have been critical to the economic health and prosperity of our communities, our States, and our Nation. Mr. Chairman, as you know, this committee is—was successful in moving the bipartisan Water Resources Development Act before the August break. I am hopeful that, with your leadership, we can continue to advance the bill forward before the end of this Congress.

The water resources bill shows what this committee can do when it works on a bipartisan basis to address the critical needs of this Nation. However, there is another issue pending before Congress that has taken a far different path and has resulted in confusion, uncertainty, strong opposition from States and stakeholders alike. Mr. Chairman, I am referring to language currently under negotiation in the National Defense Authorization Act that weakens Federal, State, and local authority to address pollutant discharges from vessels.

As you know, pollution legislation fails to exclusively—falls exclusively within this committee's jurisdiction. In fact, the last bill this committee formally considered was in the 112th Congress called the Commercial Vessel Discharges Reform Act. Yet, seemingly out of nowhere, an entirely new vessel pollution bill called the Vessel Incidental Discharge Act, or VIDA, has been added to a nongermane bill in another committee, and is now under negotiations a joint House and Senate conference.

Mr. Chairman, as you know, the committee Democrats objected to the inclusion of this never-before-seen proposal in the defense bill. This proposal is radically different from the bill this committee explored over 4 years ago, and has drawn opposition from States and stakeholders alike. I would guess that no member on this committee can explain exactly what this legislation would do, who wrote it, or who would benefit from it as, to the best of my knowledge, this proposal has undergone no congressional hearings in the House or the Senate. I know for certain no committee member or staff of the minority party has been part of the process.

What is worse is that, despite the lack of transparency, the list of States and organizations opposed to this proposal is growing as more entities come to learn of its existence. Over the past few weeks, the House and Senate have received numerous letters from States and organizations expressing concerns with the vessel pollution bill, which I ask for unanimous consent to include in my remarks for the record.[2]

Mr. GIBBS. So moved.

Mrs. NAPOLITANO. These organizations, which include State water pollution control agencies and State environmental agencies, State fish and wildlife agencies, State boating administrators, all express their concern that "VIDA exempts State authorities to protect State waters from harmful invasive species and water pollution discharge vessels." Further, these State agencies believe that "VIDA will have adverse consequences on water quality, sources of drinking water, and sensitive aquatic resources."

Mr. Chairman, over the past few years we have seen countless examples where drinking water supplies of large and small towns across the U.S. have been compromised by pollution and invasive species. In my district and in the Western States we are plagued with the invasion of the quagga mussel that has clogged water distribution systems, added pollution, and created hundreds of millions of dollars in costs for local water agencies and our constituency.

Right now, in more communities, we cannot say that the water that is delivered to our homes or our schools or our workplaces is safe to drink. Think about that. Here, in the United States, we cannot say with certainty that water we are providing our citizens is always safe to drink. Yet, according to the—the VIDA will have adverse consequences of water quality and resources—and sources of drinking water in the U.S.

So, then, will this legislation improve the operation of vessels in the armed forces and national security? No, because the discharge

[2] The letters referenced by Congresswoman Napolitano are available online at GPO's Federal Digital System (FDsys) at https://www.gpo.gov/fdsys/pkg/CPRT-114HPRT23997/pdf/CPRT-114HPRT23997.pdf.

requirements for the vessels of the armed forces are unchanged by this legislation. So this precious—this legislation puts our precious State resource waters in jeopardy to ensure that a small universe of commercial and fishing boats are no longer regulated under clean water permitting requirements.

Mr. Chairman, we have an obligation to understand proposed legislation before it has the potential to become law. Therefore, I am requesting that this committee undertake a formal legislative hearing on the vessel pollution before further action is taken in the House. I ask unanimous consent that a letter formally requesting this action be added to the record.

Mr. GIBBS. So ordered.

[The information follows:]

Submitted for Record

Committee on Transportation and Infrastructure
U.S. House of Representatives

Bill Shuster
Chairman

Washington, DC 20515

Peter A. DeFazio
Ranking Member

Christopher P. Bertram, Staff Director

Katherine W. Dedrick, Democratic Staff Director

September 7, 2016

The Honorable Bill Shuster
Chairman
Committee on Transportation and Infrastructure
2165 Rayburn House Office Building
Washington, D.C. 20515

Dear Chairman Shuster:

I write to request that the Committee on Transportation and Infrastructure hold a legislative hearing on Title XXXVI of H.R. 4909, the "National Defense Authorization Act for Fiscal Year 2017", before any further Congressional action is taken on this legislation.

This title, known as the Vessel Incidental Discharge Act or VIDA, was added to H.R. 4909 with no formal oversight or action by this Committee, the sole committee of jurisdiction over these provisions in the U.S. House of Representatives. No committee hearings have been held on this proposal, and no witnesses have had the opportunity to testify on the potential impacts of this legislation. Even the title of the section is confusing, suggesting that the VIDA provision is focused on ballast water when the impact seems to cover a far-broader array of potential discharges.

In short, this legislation was drafted by unknown parties and inserted by amendment on a non-germane bill in another committee with virtually no debate on its potential impacts or consequences. In my view, this proposal, which has far-reaching implications on our local economies, on domestic and international trade, and on the quality of our natural resources, deserves greater Congressional scrutiny.

The U.S. Coast Guard opposes this legislation. In addition, numerous individual States, state organizations, and other interested groups have expressed their strong objections to VIDA, and have collectively called on Congress to remove this provision from the National Defense Authorization Act.

To date, 13 individual States have written letters in opposition to VIDA, including letters from the Governors of the States of Arizona, California, Colorado, Minnesota, Montana, New York, Oregon, and Washington. Copies of these and other letters in opposition to VIDA are included with this letter. These letters highlight many of the potential questions and concerns with this legislative proposal and, again, demonstrate the need for additional Congressional oversight.

For example, the Governor of the State of Arizona notes that this provision is an "overly broad attempt to simplify the current regulatory system for vessel discharges [and] would dramatically increase the risk of introducing and spreading invasive species and water pollution, by removing states' authority to regulate their own waters and by minimizing the scope of pollution controls."

Similarly, the Governors of the States of California, Colorado, Minnesota, Montana, New York, Oregon, and Washington note that: (1) VIDA is not germane to national security; (2) VIDA preempts state authority; (3) in place of effective state standards, VIDA sets an insufficient national standard or no standard at all; and (4) VIDA's significant negative effects extend far beyond ballast water.

In addition, on June 16, 2016, the following state organizations sent a joint letter in opposition to VIDA to the leaderships of both the U.S. House of Representatives and the U.S. Senate: the Association of Clean Water Agencies; the Association of Fish & Wildlife Agencies; the Association of State Wetlands Managers; the Environmental Council of the States, and the National Association of State Boating Law Administrators. In this letter, these organizations noted that "VIDA will have adverse consequences on water quality, sources of drinking water, and sensitive aquatic resources … raises significant federalism issues and as such … should be developed in partnership with the states."

Finally, in its Statement of Administration Policy on H.R. 4909, the administration objects to the VIDA provisions which "undermine[] the ability to fight the spread of invasive species in our Nation's waters" and has recommended the President veto this legislation.

Therefore, I strongly urge you to hold a legislative hearing on the VIDA title of H.R. 4909 before any further Congressional action is taken on this legislation. In my view, the American people deserve to know the potential winners and losers in this proposal, and the consequences of this proposal to our local economies, to domestic and international trade, and to our environment.

Sincerely,

GRACE F. NAPOLITANO
Ranking Member
Subcommittee on Water Resources
and Environment

Mrs. NAPOLITANO. In my view, far too little attention is being given to the important topic to jam untested language through on a non-germane bill with virtually no congressional oversight within the proper committee of jurisdiction.

Our water, our local natural resources, are far too precious to take action on this proposal without fully understanding its impact.

I yield back the balance of my time.

Mr. GIBBS. At this time I want to welcome our three witnesses.

Our first witness is Rear Admiral Paul Thomas. He's Assistant Commandant for Prevention Policy, United States Coast Guard.

Our second witness is Rear Admiral Shepard Smith. He's the Director of the Office of Coast Survey, National Oceanic and Atmospheric Administration, or NOAA.

And Mr. Edward Belk, he is the Chief of the Operations and Regulatory Division of the United States Army Corps of Engineers.

Admiral Thomas, welcome, and the floor is yours.

TESTIMONY OF REAR ADMIRAL PAUL F. THOMAS, ASSISTANT COMMANDANT FOR PREVENTION POLICY, U.S. COAST GUARD; REAR ADMIRAL SHEPARD M. SMITH, DIRECTOR, OFFICE OF COAST SURVEY, NATIONAL OCEAN SERVICE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION; AND EDWARD E. BELK, JR., P.E., CHIEF, OPERATIONS AND REGULATORY DIVISION, U.S. ARMY CORPS OF ENGINEERS

Admiral THOMAS. Good morning, Chairman Gibbs, Ranking Member Napolitano, and distinguished members of the subcommittees. I am honored to be here today to update you on the Coast Guard's efforts to modernize marine navigation systems and to enhance mariner situational awareness.

With the growth and diversification in domestic energy production and the associated industries, increased use of Arctic shipping lanes, and the simple need to move more people and cargo by water in the decades to come, the demand on our Marine Transportation System, or MTS, is unprecedented and it is growing.

Working with our partners, such as NOAA and the Army Corps of Engineers, and through the interagency Committee on the Marine Transportation System, or CMTS, which I am proud to chair, we are modernizing America's waterways for the 21st century.

Through six key initiatives, carried out with extensive stakeholder and interagency outreach and coordination, we are reviewing and baselining our current aids-to-navigation system. We are modernizing our physical aids system. We are incorporating automatic identification system, or AIS ATON, into system design and operation. We are modernizing the delivery of marine safety information to the mariner, developing data-driven, risk-based tools for modern waterway system design. And finally, we are improving public notification and participation in waterway system improvements.

To enhance our physical ATON constellation, we are now broadcasting over 350 electronic aids through the nationwide automatic identification system. This year we will prototype our smart bridge, smart lock, and digital light ship initiatives, all of which provide waterway users real-time information about navigational aids and navigational conditions, and enable smarter decisions that help to

increase safety, reduce congestions on our waterways, and enhance the environment. And we can do this even in areas where AIS broadcasts are not currently available.

Our interagency enhanced marine safety information initiative, or the EMSI initiative, will coordinate all Government-provided navigation information services into a single integrated service delivered via the Web, accessible on common devices, and interoperable with existing shipboard and land-side navigation and logistics systems.

For the first time, a mariner will be able to enter an intended route and quickly and easily find all the information needed to safely navigate that route. In the near future we will build a capacity to provide real-time updates to the mariner during the transit.

But even as technology continues to change how mariners navigate on our waterways, we remain focused on implementing the proper mix of physical and electronic aids to navigation. The Coast Guard understands that physical aids will continue to be a vital component of our ATON system. Given this, it is critical that we recapitalize our aging fleet of inland and construction tenders. Our fleet of 35 inland aids to navigation cutters services over 27,000 aids, or 56 percent of the entire physical ATON constellation, nationwide.

And yet, this fleet has an average age of 52 years, with some of our cutters more than 60 years old. The fleet is well past its service life, but we are committed to maintaining operational capability on our inland waterways. To that end, we are in the final stages of the Inland River Tender Emergency Sustainment project, intended to maintain the operational capability of these cutters until a solution can be identified. And we have worked closely with the Army Corps to research alternatives for the recapitalization of this fleet.

In addition, the Coast Guard is currently conducting comprehensive mid-life vessel sustainment for our fleet of 225-foot seagoing buoy tenders, and our 175-foot coastal buoy tenders, to ensure that they can continue to sail safely, and effectively execute their critical missions.

The Service is grateful to this subcommittee's strong and ongoing support for the sustainment and recapitalization of these nationally critical fleets.

Again, I want to thank you for the opportunity to testify today, and for your continued support of the United States Coast Guard. I look forward to your questions.

Mr. GIBBS. Thank you, Admiral.

Admiral Smith, welcome, and the floor is yours.

Admiral SMITH. Good morning, Chairman Gibbs, Ranking Member Napolitano, and members of the subcommittees. My name is Shep Smith, and I am the Director of the Office of Coast Survey at the National Oceanic and Atmospheric Administration. In this capacity, I also represent the United States at the International Hydrographic Organization. Thank you for the opportunity to testify today on how NOAA is advancing navigation services.

I am pleased to testify alongside the United States Coast Guard and the Army Corps of Engineers. Our agencies coordinate activities and programs regularly, from local and regional harbor safety

committees to national program coordination and joint participation in academic and public venues.

This hearing comes at a pivotal time for marine navigation, and I am pleased to offer some highlights of my full testimony, which is submitted for the record.

NOAA's role in marine navigation is to provide authoritative nautical charts—tides and currents and weather. I will be focusing my brief remarks today on nautical charting.

We have nearly completed a transition to a digital nautical charting production system, which will improve the consistency and efficiency of our charting program. Just as importantly, it will allow us to move beyond the limitations of depicting information on paper charts, creating digital charts optimized for the needs of today's electronic navigation systems, and supporting increasingly automated navigation. Over the coming year we will be drafting and taking public input on a new, national charting plan which will incorporate all of this public input to envision an updated chart suite.

In addition to new charting technology, NOAA is leaning forward to take advantage of the proliferation of available relevant geospatial information and observation technology. We are using satellite imagery derived bathymetric estimates in shallow, clear areas. We have stood up a public database for worldwide crowd source depth data from volunteer vessels with the potential for thousands of users within a few years. We plan to use this satellite data and crowd source depth data to identify areas where charts are no longer accurate, and to support temporary chart updates.

We are using LiDAR [Light Detection and Ranging] data from Army Corps and NOAA aircraft to accurately survey shallow coastal waters. We use multibeam data from other agencies where it is available, relevant, and suitable for charting use. We have begun to use unmanned survey systems to complement our manned systems, and we see opportunity for greater use in the near future.

At the core of our survey efforts, our own ships and aircraft and those of our hydrographic contractors provide the high resolution object detection surveys needed to accurately measure depths and find isolated hazards, and in areas where other sources are not available.

NOAA is working to ensure the Nation has a fleet of research ships that meet the Nation's observation requirements. Coast survey is engaged with the NOAA planning efforts to identify and refine the requirements for replacement survey vessels capable of supporting unmanned systems and sustained operations in environmentally sensitive areas.

In electronic navigation systems, charts are used along with information from weather, water levels, currents, constantly changing channel conditions, and EMSI to plan, monitor, and execute a voyage. Many of the most innovative and advanced navigation systems are made by U.S. companies, and are built on the foundation of NOAA's, the Coast Guard's, and the Army Corps' freely available navigation information. These systems are putting the best available technology onto U.S. boats and improving the safety of the commercial vessels and the 34 million U.S. boating families.

We have begun a test bed project in the Port of L.A./Long Beach to prototype a new high resolution chart to support precision navigation for large ships transiting the tightly constrained waterways of that port.

NOAA is working with the Coast Guard on the two Arctic port access route studies and with the Army Corps on their Arctic deepwater port study. In addition, we hosted a charting workshop in Anchorage in March of this year with Federal, State, tribal, and local interests to prioritize the highest risk areas for Arctic navigation.

To date, we have focused our survey and charting efforts along frequently traveled routes, in approaches to towns and facilities, and in potential harbors of refuge. Our survey work in Alaska is highly constrained by a short survey season, lack of logistical support, and the age of our two survey ships, both approaching 50 years old.

NOAA plays a unique and important role by providing critical information infrastructure to support safe, reliable, and efficient navigation in maritime commerce. Thank you for the opportunity to discuss the state of NOAA's services with you this morning, and I welcome any questions you may have.

Mr. GIBBS. Thank you, Admiral.

Mr. Belk, welcome, and the floor is yours.

Mr. BELK. Thank you, Chairman Gibbs. And thank you as well to Chairman Hunter and the distinguished members of both subcommittees. I am Eddie Belk, Chief of the Operations and Regulatory Division for the U.S. Army Corps of Engineers here at our headquarters in DC. I am honored to appear before you this morning to discuss issues associated with Federal maritime navigation programs, with an emphasis on interagency cooperation and technological change.

This fiscal year the Corps is investing just over $2.6 billion appropriated by Congress to study, design, construct, operate, and maintain our national infrastructure portfolio, including channel deepening projects to accommodate post-Panamax vessels and recapitalizing aging locks and dams to increase reliability and efficiency of our inland waterways. This investment also supports continued development of data-informed navigation capabilities and technologies that I will discuss this morning.

Over the past decade the Corps has experienced significant improvement in the data we collect, create, and utilize to operate and manage Corps maritime assets. Our philosophy is to collect data once and then use it many times over by sharing it very broadly both within the Corps and with others.

The concept behind e-navigation, as we call it, emphasizes harmonizing data and information across all public and private stakeholders. We believe that interagency e-navigation efforts directly contribute to improved safety, efficiency, and reliability of the Marine Transportation System.

The Corps is successfully applying e-navigation capabilities today, with more on the way, through ongoing research and development programs. The Corps is the United States nautical charting authority for inland waterways. For the past decade, the Corps has created over 7,200 miles of detailed inland electronic navigational

charts. Since 2013, over 6 million of our charts and chart updates have been downloaded by mariners, providing the most up-to-date information for safely navigating our waterways.

The Corps is responsible for surveying all Federal channels, harbors, and waterways in order to report channel conditions to our partners and stakeholders. The past year the Corps deployed our e-hydro tool across all coastal offices. This tool takes hydrographic surveys of the navigation channels and standardizes the data for use in enterprise tools. This improves our ability to more quickly create and disseminate more consistent products.

Example products include automatic development of channel condition reports that are provided to NOAA for their use in nautical charting of coastal waters, as well as standardized electronic maps for use by waterway operators, ship pilots, Federal partners, and the public. The e-hydro tool is being expanded to the inland waterways with applications that create inland survey overlays for Coast Guard use to improve the accuracy and efficiency of setting physical buoys on our rivers.

Another recently developed e-navigation tool is the Corps of Engineers lock operations management application, or LOMA. This uses real-time vessel tracking data from vessel automatic identification systems, or AIS, to provide our lock operators with visibility on the movement of commercial vessels along the inland waterways. LOMA was deliberately designed to be interoperable with the Coast Guard's nationwide AIS system, using common architecture and software to manage the millions of daily AIS data messages from moving vessels.

Building LOMA in partnership with the Coast Guard saved the Corps time and significantly reduced development risks. The Corps and the Coast Guard continue to work in partnership to improve the system, and to make the most of these shared capabilities.

Other capabilities being tested include the transmission of information on physical aids to navigation that augment those important directional and safety tools. For the first time on U.S. inland waterways, the Corps, working closely with the Coast Guard, transmitted a virtual aid to navigation to mark a sunken vessel where the establishment of a physical buoy was not possible due to adverse river conditions.

Additional capabilities include transmitting water current velocities to towboat operators as they approach lock structures so they are situationally aware of unexpected adverse conditions at the lock entrance. We believe transmitting such information will help increase lock reliability, and improve mariner safety by reducing allisions that can damage or close locks.

We continue to work with NOAA, the U.S. Coast Guard, the National Geospatial-Intelligence Agency, and other Federal providers of navigation information to create an integrated marine safety information service for all waters of interest to U.S. mariners. This will provide commercial mariners and the public with common access to marine safety information that is tailored for their specific needs, available in formats usable on their specific equipment or systems.

In closing, the Corps is actively engaged with partner agencies and maritime users to accelerate the development and deployment

of technological enablers for the mariner, while harmonizing data through e-navigation principles. We are committed to improving our use of data from other agencies and waterway stakeholders and to making our data and information widely available for others to use.

I appreciate the opportunity to testify today, and look forward to answering any questions you may have.

Mr. GIBBS. Thank you. I will start off the questions. For Admiral Thomas and maybe Admiral Smith, I guess both, you know, we have seen technology just grow immensely in the last couple decades. Satellite technology and navigation technologies and all of that. And I guess Admiral Smith mentioned about how you were working to do a national charting plan and looking for input from the public, and then to Admiral Thomas, responsible for this electronic navigation, getting all the vessels and real-time information.

How is that being incorporated between the two? And then, you know—and I guess a simpler question, too, is: is there an e-navigation app? What is the status on this technology in both commercial and recreational users, and how does this incorporate what Admiral Smith is trying to do with the charting?

Admiral THOMAS. Well, thank you for the question, Mr. Chairman. There—it is a great question. There is a lot going on, a lot of new technologies.

We coordinated our efforts between our three agencies and many others through the Committee on the Marine Transportation System, which I mentioned. And that particular committee has an e-nav subcommittee that is focused exactly on your question, which is how do we make sure that we are developing systems that work with each other, that talk to each other, and that are going to be accessible to the users on the waterway.

And I will let Admiral Smith talk about some of the technical details, because he is more conversant on those, but I will just add that a huge part of getting to where we need to be with e-navigation is harmonization of the data sets kept by the Army Corps, the NOAA, and the Coast Guard. And we are working hard on that and making great progress. And when that effort is complete, you will see leaps and bounds of progress.

Mr. GIBBS. Is the technology being adapted by both commercial and recreational users of vessels? Is it adaptable so they can use it?

Admiral THOMAS. Yes, Mr. Chairman, it is. And we see, you know, broad use of—as we develop products and make them available, we are seeing them used very broadly——

Mr. GIBBS. How does that incorporate with—you say you are doing a national charting plan, looking for public input. How do you merge the two together so it is friendly for the users?

Admiral SMITH. Yes, sir, Mr. Chairman. The charting plan is really specifically about charts. We have a very robust distribution system for charts that go from recreational, chart plotters, and the light commercial systems that are in use and all the way up to the type-approved systems. All of that is very mature.

What we are hoping to add on, through our joint distribution of other types of data, are the tides, currents, weather, and EMSI, and for the data to be well integrated into these systems. Some sys-

tems are already at this level of maturity but there is room for improvement in standardization and the way that that data are distributed.

Mr. GIBBS. Mr. Belk, you know, there is over 25,000 miles of Federal navigation channels, and the Army Corps is responsible for conducting hydrographic surveys. And I think in fiscal year 2016 the workplan for your operation and maintenance, there was 30 entries for project condition surveys, totaling $17.5 million. Would you say that amount is high, average, or about right?

Mr. BELK. Could you repeat the question, Chairman? I missed part of that.

Mr. GIBBS. Well, about the surveys, I think this past year—your plan of operation and maintenance, you had 30 entries for project condition surveys, nearly $17.5 million. Is that a typical figure? Is that about right, or is that not enough, or——

Mr. BELK. Chairman, that is about right. We received some additional funding from the Congress this year that we are able to utilize through our workplan to get after and take care of more condition surveys this fiscal year.

Mr. GIBBS. We are talking about the Federal navigation channels. What role would the Inland Water Users Board and also vessel operators play? It just came to my attention up in the Cleveland Port in my area—I am from Ohio—there is a question about the survey getting done for dredging the Cuyahoga River at the port.

That is—you know, what kind of input does the port get from the operators? And then, of course, you know, elsewhere, in the Inland Waterways User Board—what kind of input, what kind of interaction is there between your shop and them?

Mr. BELK. Yes, sir, Mr. Chairman. Thank you for that question. There is a tremendous amount of interplay between the Army Corps of Engineers and the Inland Waterways User Board. In fact, our next meeting of the Inland Waterways User Board will be the first week in October in Chicago. We meet quarterly.

The Inland Waterways User Board is comprised of senior leaders from across the navigation industry that are appointed. The Corps of Engineers is also involved in that user board. We get tremendous input from them, and we also are able to describe to them our challenges and the priorities that we are getting from the Congress. Together we are able to describe where we can apply the funds we do get to buy down the most risk.

One of the accomplishments that we have achieved this year, in partnership with the Inland Waterways User Board and industry, is the capital investment strategy that lays out a 20-year plan. It will invest almost $5 billion over 20 years to buy down the most risk across the national system.

That partnership with the Inland Waterways User Board has resulted in our ability to identify and buy down the most risk with each dollar that is appropriated by the Congress.

Mr. GIBBS. Yes. I want to—in a future question—my time is up—I want to talk a little bit—I want to ask more questions about the capital plan.

At this time I yield to Ranking Member Grace Napolitano.

Mrs. NAPOLITANO. Thank you, Mr. Chairman. The Federal maritime programs we are discussing today are in place to provide effi-

cient and effective transportation of goods and people—especially important in my area.

I am concerned when bad actors—this is a little bit out of the bailiwick here, but I am concerned that bad actors in the shipping industry have recently—one of them has recently declared bankruptcy. Hanjin. And it affects our national economy, putting employees out of work, the transportation sector out of work, delayed arrival of goods, and increasing the shipping rates. There are several ships already sitting out in the sea.

I recognize the subject is not the topic of today's hearing, and witnesses are not involved in the economics of global shipping, but I would ask any of the witnesses to comment on the current trends in global shipping and the crisis in Hanjin ship sitting off our coastline. And are you concerned about that? I know the Coast Guard has a role to play in that.

Admiral THOMAS. Well, thank you, Congresswoman Napolitano. We are, of course, aware of the situation with Hanjin Shipping. There is tremendous pressure on containerized shipping—in particular, globally. There are a number of ships that have been laid up, and Hanjin is managing their financial crisis.

You know, our role is to ensure that, before those ships enter U.S. ports, that they can meet their financial obligations, particularly those to the U.S. Government. And that is in the form of what we call a certificate of financial responsibility.

In the case of the two ships that are currently off the west coast—and I believe one off the east coast—you know, Hanjin's longstanding financial arrangements have been nullified by their bankruptcy, but they are negotiating those arrangements on a case-by-case, ship-by-ship, port arrival-by-port arrival basis, and I believe that they have reinstated their COFRs with the U.S., and they are making individual arrangements for port services, so that they can come into port and unload their cargo.

Mrs. NAPOLITANO. Good, because it affects the Nation, not just our western port.

Mr. Belk, your testimony notes the potential benefit of vessel automatic identification system to address congestion along the inland waterways and coastal ports. The Water Resources Development Act of 2007 directed the court to implement vessel congestion mitigation strategy for the Upper Mississippi and the Illinois waterway slot. Can you give the committee an update on the implementation of these provisions?

It seems that the trend is for Congress to fund the Corps at below capability, resulting in authorized projects taking longer for construction to get started, and for the American people to receive the benefit of this project. How can vessel congestion strategies such as the automatic identification systems be used as we wait for construction funds to—for these authorized navigation projects?

Mr. BELK. Yes, ma'am. Thank you for the question. The Corps of Engineers is working very closely with the industry at a number of levels, to make sure that we are communicating with each other and are aware of traffic movements as they occur. The Inland Waterways User Board is at the strategic level, and we also have regional boards, like the regional—industry executive task force that we work with to look at traffic patterns. We have daily communica-

tions between our field folks and the Coast Guard and the navigation industry to make sure that we are all talking and understand the movement.

In addition, we have developed a couple of tools recently that we have made available. One we released just this spring announces publicly on a Web site all proposed channel closures and restrictions that we anticipate in the coming work season. What that allows the industry to do is make plans weeks and months in advance to account for those kinds of construction improvements, so that they are not an active discovery. Having those identified and posted helps industry react and reduce the impact to the American people.

Mrs. NAPOLITANO. Thank you for that. Mr. Chairman, I yield back.

Mr. GIBBS. Mr. Webster?

Mr. WEBSTER. Thank you, Mr. Chair. I have a NOAA question.

Our State—my State, Florida, and our water management districts, which are regional—and then we have county governments—they do hydrographic surveys. And I am wondering, is that information that they gather, is that used in coordination with what you are doing, as far as that same effort?

Admiral SMITH. I am familiar with a few surveys from a few years ago that were in areas of borrow pits and that sort of thing for coastal Florida. And we do use that information when we become aware of it.

We have an active program under our integrated ocean and coastal mapping program, where we band together with several different mapping organizations for the Federal, State, local, and even private sector, so that we stay aware of what data is available. And we do use it for charting, where it is relevant and suitable for charting.

Mr. WEBSTER. Is there a standard—some kind of standard for the data in the way that it is formatted, or anything like that, that would be helpful, that that information might even be better used?

Admiral SMITH. Modern systems are generally interoperable. We generally can read each other's data without much of a problem. There are issues sometimes with datums—the vertical and horizontal references for the data.

NOAA's VDatum is a nationwide program that allows us to transform data from one datum to another, so that most of those interoperability problems are now taken care of.

So, the most important thing is for us to know about available data, and for it to be relevant for navigation. Not all hydrographic surveys that are done are relevant for navigation.

Mr. WEBSTER. Would it be easy for them to adapt to gathering the data that you would need with—and that some of the mechanics are the same and so, therefore, would it—is that something that they could do that would make that data better?

Admiral SMITH. We have a set of publicly available documents called our specifications and deliverables for hydrographic surveys, which define exactly what it is that we need from a survey data set to be fully compliant for navigation. Contractors could use these specifications for a reference.

However, that is if we contract for a survey. If someone does a survey for another reason, we can use that data to its full effect, as long as it has some relevance for navigation.

Mr. WEBSTER. Thank you very much. I yield back.

Mr. GIBBS. Mr. DeFazio?

Mr. DEFAZIO. Thank you, Mr. Chairman.

Admiral Thomas, I read from staff that, you know, you are augmenting physical aids to navigation with electronic. That sounds OK. But it goes on to say, "Reduce, where possible, the number of physical ATONs that require regular seasonal maintenance."

I realize you have budgetary issues here, but here is my concern. You know, you are now allowing people to not carry physical charts. And unless their own computers were corrupted, that probably isn't a big issue. But we have talked about the vulnerability of the GPS system. Congress mandated that you move ahead and look at, you know, what we might use as a backup. But, you know, we have a report from GAO that was rather critical a couple of years ago about DOT and DHS making any progress on what would be or what is the necessity of having a backup system.

So, I am concerned that this is yet another step. I mean, so if I don't have physical charts but, you know, I have still got charts, let's say, either on my computer or I have got a physical chart, and I can navigate to an actual buoy, if the system is down, great. But if we take out the buoys and we are now going to have virtual buoys, you know, we are creating yet another vulnerability. And I am very concerned about this trend.

And, I mean, can you tell me where are we at in developing a backup system?

Admiral THOMAS. Well, thank you, Congressman, for the question. Really, two parts there. I will—we have not removed a single physical aid to navigation, as a result of our ATON initiatives.

And, in fact, we are augmenting our physical systems. We are looking at modernizing our physical aids. You know, what are the buoys? How can—because—you know, how can we make them lighter? Because all those things drive the requirements for the cutters that I discussed that definitely need to be recapitalized. So physical aids are and will continue to be an integral part of our navigation system, and we are on record of saying that the physical aids are, in fact, the backup for the electronic navigation systems.

We share your concern, and I know Congressman Garamendi shares it as well, with what is the national backup for our precision navigation and timing system. This is a piece of nationally critical infrastructure that is essential for all modes of transportation. It is essential for many utilities, for financial systems. It is essential for national defense. Our Nation needs a backup system.

The Coast Guard is supporting DHS in their role on the National Executive Committee for Space-Based Positioning, Navigation, and Timing, and we are confident that they are on the right track to identify the right solution for our Nation, and that that solution, once in place, will have utility for maritime navigation, as well as for all the other systems that depend——

Mr. DEFAZIO. Do we have a timeline on when some conclusion is going to be reached?

Admiral THOMAS. You know, we support the effort, and we are currently working with the NextCom to identify their requirements for a national backup for PNT. That document is supposed to be completed this year. And once their requirements are known, we can move ahead smartly, identifying the potential technologies that might be employed to give us the backup capability.

Mr. DEFAZIO. OK. Thank you. Admiral Smith, you mentioned about—that, you know, you can use survey data that was done for other purposes, if it is verified. I am wondering. Are we anywhere near technology where—I mean, you know, we have Google Maps, and they can tell me where congestion is because of crowd-sourcing on the highway.

Is there any potential or possibility that either, you know, through ships transmitting real-time data as to depths—I know—let's say, for instance, recreationally, the inland waterway east coast, big problem, shifting bars, et cetera. If people were certified and set up to transmit data back to you real time—and, you know, could that—is that a possibility? Is that something you are looking at?

Admiral SMITH. Yes, sir. We have stood up—under the auspices of the International Hydrographic Organization, and with some of our international partners, a data center at the former National Geophysical Data Center in Boulder, now the National Centers for Environmental Information. This cloud-sourced database allows any user to upload their vessel's track line information, which contains their GPS coordinates and their depth readings, and will pull that information together and make it available to any user. So this is publicly in, publicly out. It is run by us, but it is not quality controlled.

This has just stood up in the last few months. We envision using this to be able to assess where the sea floor is changing, and where we have problems with our charts. And perhaps, once we see how dense the data is and how confident we are, to make temporary chart changes while we are waiting for a full survey to resolve the issue.

Mr. DEFAZIO. So you would advise mariners that this is from aggregate data, you haven't certified it through an actual hydrographic survey, but caution or whatever should be exercised in——

Admiral SMITH. Yes, sir. On the paper charts we can display it in a slightly different way. Through electronic systems there are some flags that we can put on the data to indicate that it is not from a real survey.

Mr. DEFAZIO. Right.

Admiral SMITH. And we use a similar type of arrangement for satellite-derived imagery, which we also have less confidence in.

Mr. DEFAZIO. OK, thank you. And I do want to just say, as a comment, that I am very concerned about the age of the fleets being used, both by the Coast Guard and NOAA. And it is long past time where Congress should take definitive action, because we are looking at crippling ourselves if we don't make these investments in new ships and the technology that could accompany them.

Thank you, Mr. Chairman.

Mr. GIBBS. Mr. Davis?

Mr. DAVIS. Thank you, Mr. Chairman.

Mr. Belk, a quick question for you. Section 1034 of WRRDA 2014 directs the Corps to encourage the adoption of advanced modeling technologies to streamline project delivery or improve upon water resource projects. How has the Corps utilized its authority to adopt or aid any e-navigation technologies?

Mr. BELK. Yes, sir. Thank you, sir, for the question. So the use of modeling is critically important to the Corps to inform both how we design and construct our infrastructure, and also how we operate and maintain it. We are making significant investments in those capabilities, primarily through our Engineer, Research, and Development Center, where we have world-class experts who help us use the best available technology, best available models—both physical and mathematical models—to inform our designs and our operations and maintenance practices.

So, we are making investments there, and we are applying the results we get from those efforts to more efficiently use the dollars that we get from this Congress to operate and maintain our Nation's waterways infrastructure systems.

Mr. DAVIS. OK. This is a question for all three of you, I guess. Are any of your agencies utilizing drone technology to help with your mapping process? And, if so, are you running into any issues with the FAA?

We will start with you, Mr. Belk.

Mr. BELK. We are utilizing drone technology. We use it more for aerial surveys than mapping. For example, we had some significant flooding over parts of the Mississippi Valley and—well, significant portions of the Nation this year. We would frequently use drones to provide us a quick aerial view of what is happening on the ground, so that we can more quickly assimilate what we need to do in the way of disaster response. We are using it more in that mode than we are in surveys, although we are doing a little of both.

Mr. DAVIS. Are you running into any problems with the FAA certifying your ability to use them?

Mr. BELK. Sir, we have to work within DOD requirements as we use those technologies. I wouldn't say we are having problems, but there is a process that we have to go through in order to use those technologies.

Mr. DAVIS. OK. Admiral Smith?

Admiral SMITH. Sir, NOAA, in general, uses drones in a variety of ways. We don't use any directly for the charting program. If, by drones, you mean airborne. We do have some on-the-water assets, which are small autonomous survey vessels, which do share some of the benefits of airborne drones, and some of the challenges of having unmanned systems out there. And we are working right now within some very tight guidelines and with some emerging best practices that the Coast Guard is publishing.

Mr. DAVIS. OK, thank you.

Admiral Thomas?

Admiral THOMAS. Sir, we don't use unmanned aerial systems in the prosecution of our missions related to marine navigation or aids to navigation. The Coast Guard is testing systems that we use off of our cutters for, you know, extending the legs of those cutters. But that is not within my portfolio.

Mr. DAVIS. Mr. Belk, I have got a little bit of time left. As you may know, I am from central Illinois, so the Mississippi River and Illinois waterways are a priority of mine, and have been for a while. I am a strong proponent of maintaining the lock and dam systems we have there, and upgrading them.

What would you say is the current conditions of the locks and dams on the Upper Mississippi and the Illinois?

Mr. BELK. The Corps of Engineers supports interstate commerce and international trade. And so, navigation is crucial to enabling that. And our lock and dam systems are key to that. We have a number of locks on both the Illinois that you are particularly interested in, and the Upper Mississippi. The condition varies, but there are significant requirements we are having to place in the operation and maintenance of those as they age. They are in excess of 60 years old, on average.

Mr. DAVIS. And with that, the age, what kind of impact do you think that age is going to have on our ability in the Midwest to move commerce up and down the navigation system? And is the Corps ready to move forward with maintaining and—you know, our goal is to expand them.

Mr. BELK. Yes, sir. Fortunately, Congress has provided additional funding in the last few appropriations acts, that we have been able to use to buy down risk across that system.

We are also applying asset management principles across our entire portfolio of inland navigation infrastructure, to include the Illinois and the Upper Mississippi. What that allows us to do is identify the risk associated with all our assets, and the consequences of failure of those assets. Those two things help us decide what our right priorities are so that every dollar we get from this Congress we apply to buy down the most risk.

So, a lot of that does go to the Illinois and the Upper Mississippi, but other parts of the Nation, as well.

Mr. DAVIS. And I am going to break the rule and quickly ask you. What is it going to take to get shovel ready and shelf—off the shelf?

Mr. BELK. Sir, at this point the project has been authorized and we will move as quickly as appropriations and funding allow.

Mr. GIBBS. Mr. Garamendi?

Mr. GARAMENDI. Thank you, Mr. Chairman.

Admiral Thomas, a moment ago, in response to a question by the ranking member of the full committee, Mr. DeFazio, you said that the Coast Guard is going to complete a study on technologies that might be available as a backup system some time this year or in the near future. Could you expand on that and tell us what that study is all about and what technologies you are looking at?

Admiral THOMAS. Congressman, let me first thank you for keeping us all focused on this really critical issue of a backup position navigation and timing system for our Nation. I may have misspoke, but what I meant to say was that the Coast Guard is supporting DHS in their role on the National Executive Committee for Space-Based PNT. That committee is undertaking currently a requirements generation effort, which will define the requirements for a complementary PNT system. And once those requirements are de-

fined, the executive committee will then begin the assessment of competing technologies that might meet that requirement.

So it is not a Coast Guard study. Coast Guard is certainly supporting the department. NPPD has the lead for the department in that. And, as you know, DOT really has the lead for our Nation.

Mr. GARAMENDI. What is the timeline for the completion of this?

Admiral THOMAS. I can't speak to the completion of the technology assessment, but I think—I am told the goal for the completion of the requirements document is this year.

Mr. GARAMENDI. I am just trying to add up the number of years that this process has been underway, and I think it is approaching 20. And, frankly, I don't understand. It makes absolutely no sense to me. We know that there is a backup system that is deployed in other parts of the world, as in China and Russia, and in parts of Europe. And I don't get it. I really don't.

And you are right, it is a mission of mine. So I think I will continue to push and shove. Frankly, I am very, very disappointed in the administration in all this—as it continues to circle around and circle around what we know is a backup system that is readily available to us. And we do know that GPS—one further question before I just continue on that way.

All of this new navigation electronics, as mentioned in your paragraph here, "the use of and increasing dependence on electronics and technology." Is that dependent on GPS?

Admiral THOMAS. Very much so.

Mr. GARAMENDI. I thought so. Just wanted it on the record.

A couple of other questions come to mind, and I will get to those. The Arctic, I don't think we have discussed the Arctic yet today.

Admiral Smith, I think you are at least partially responsible for the navigational guides and charts of the Arctic. Please update us.

Admiral SMITH. Congressman, we have a suite of charts for the Arctic, which we have had for many years. The data on those charts is pretty old. And in some cases we don't——

Mr. GARAMENDI. But what does "pretty" mean? Eighteenth century, seventeenth century, sixteenth, or maybe twentieth?

Admiral SMITH. Yes, going back to the 1800s in some cases. But, in fact, that is true in other parts of the country, as well.

And so we are concerned about this, and we have been prioritizing our survey efforts and our charting efforts on the current and expected growth in economic activity in the Arctic. So we have been working with the Coast Guard on the port access route study, where most of the traffic will be, and ensuring that those areas are well surveyed and well charted. The Red Dog Mine and other local areas of economic activity have been a high priority.

Whenever we hear about more vessels needing to go ashore or going into places, those areas become our next priority——

Mr. GARAMENDI. So, really, the best method we have of knowing what is beneath the surface of the ocean is when somebody goes ashore and we can say, "Ah, we have discovered a new shoal"?

Admiral SMITH. No, sir, that is not what I meant. I meant that areas of increased vessel activity were an indication of where we needed to prioritize our efforts.

Mr. GARAMENDI. So when they go ashore we want to know why and where.

What resources would be necessary to deal with this Arctic situation, which we know is the new Northwest or Northeast Passage? What kind of—what resources are necessary to try to get ahead of the shoaling of various vessels, which apparently is the way in which we now know there is a new shoal or an old shoal that we didn't know about? What do we need in resources?

Admiral SMITH. I want to just clarify my remarks if you thought that I meant that we were updating the charts based on shoaling. Many small craft in Alaska actually are landing craft, because there is no port facility. When they go ashore, moving up onto the shore is how they get their fuel and other things to the small towns up there.

So, after that clarification, the resources—we clearly are not going as fast as we could. We are hampered, as I said in my opening remarks, by the short survey season, by the age of our ships, and their ability to go to these remote places safely, and by the need to balance our survey and charting resources across the whole country.

Mr. GARAMENDI. Just a final comment here. We have done numerous hearings about the Arctic, about the necessity of understanding the Arctic in detail, everything from icebreakers to beyond. And in every one of those hearings, the issue of charting and understanding the sea floor is of critical importance.

I need from you and from the Coast Guard—we need, I should say—specific information on what the requirements are to advance our knowledge of the sea floor in the Arctic, so that we can avoid shoaling as the principal way of understanding where the reefs are. So could you deliver some level of knowledge and information to us so that we might put that into our planning?

Admiral SMITH. Yes, sir. I know we are over time here, but we did conduct a study of Arctic gaps and plans at Congress' request, and that study is currently in clearance.

Mr. GARAMENDI. Thank you.

Mr. GIBBS. I just thought I would make a comment. I believe that this committee 4 years ago kind of gave a blank slate to move forward in this. And I think you need to report. You can get back to the Coast Guard and Maritime Transportation Subcommittee. It would be much appreciated—in a timely manner. Thank you.

Mr. Sanford?

Mr. SANFORD. Under the category of technological change, for instance, the port in Charleston, obviously, would have a lot of commercial users, and it would have backup with a paper chart. But the bulk of, for instance, the First Congressional District would be charted but irrelevant to a commercial user. So, as a boy, we would use charts wondering around St. Helena Sound or Port Royal Sound. But now, hop in a little boat, and it has got a Garmin, and off you go.

Can you give me the breakdown—first of all, are the paper charts a loser, from a financial standpoint, or a winner? Do you make money on them, or you lose money on them?

Admiral SMITH. We do not sell charts directly any more. So we have privatized the entire printing and distribution for paper charts.

Mr. SANFORD. So then they—it is a contract and they pay you for the ability to do so?

Admiral SMITH. They give us a very small royalty, which basically covers the cost of the servers that we need to——

Mr. SANFORD. So it is a wash.

Admiral SMITH. We are not making any money on it. No, sir.

Mr. SANFORD. Losing money, or no?

Admiral SMITH. Well, we have appropriated funds to provide charting services for the——

Mr. SANFORD. How much is that?

Admiral SMITH. So, overall, if you are including the surveys as well as charting—and if you include our contracting efforts and our own ships, it is about a $128 million program.

Mr. SANFORD. So we spend $128 million on that, some of which would be things like the Arctic sea floor, where there aren't, you know, a lot of recreational users up there. But if you break out that portion, which we particularly—it would either be commercial or scientific versus recreation—what would the split be, roughly, in terms of users?

Admiral SMITH. That is not a very fine line. As you pointed out, some of these areas overlap.

In the last 25 years or so, since the technological revolution, where we could get full-bottom sea floor surveys, we decided 25 years ago to focus our efforts with this new technology on deep draft ships going to major ports.

Mr. SANFORD. OK.

Admiral SMITH. That has been the focus of our efforts for the last 25 years. During those 25 years we have spent less time in recreational areas, as——

Mr. SANFORD. I guess my point, what I am getting at, is would there be a way of saying we are just not going to do that part any more? I mean, you know, St. Helena Sound is an interesting place, I love it, but it is irrelevant, from the standpoint of a commercial user. And the local shrimp boats that go there, they know the waters real well.

So, I mean, would there be a big cost savings in saying there are certain areas we are just not going to do any more, and people can figure that out on their own, or no? It is on the margin?

Admiral SMITH. My responsibility in my position is to provide safe navigation services to all boaters on the water. We make every effort to manage——

Mr. SANFORD. Understood. But I am just saying, I mean, the vast majority of those recreational users aren't pulling a chart any more. If they are using anything, they are using, you know, Garmin or whatever, and——

Admiral SMITH. Maybe I could clarify that, because Garmin gets their chart information from us.

Mr. SANFORD. Right.

Admiral SMITH. So the charts that they are using are ours. Garmin is redistributing them and making them available in a convenient and well-designed device that suits their needs.

Mr. SANFORD. And it would be updated——

Admiral SMITH. The source charting information is still ours.

Mr. SANFORD. Sure. And they would be updated how often?

Admiral SMITH. It depends on the area. A lot of those are Army Corps surveys that we update as frequently as they come along.

Mr. SANFORD. Which would be how often?

Admiral SMITH. It depends. Sometimes they survey once a month, sometimes every 5 years. So it depends on how——

Mr. SANFORD. So there is this split, currently, then. So if it is a more recreational area, not a lot of commercial users, it might be once every 5 years if they are doing—again, using St. Helena Sound as an example. Would that be right?

Admiral SMITH. I don't know the details on that particular body of water.

Mr. SANFORD. No, I am just picking it randomly.

Admiral SMITH. Yes, sir. So less—if it changes less often, and it is less critical, it will be surveyed less frequently.

Mr. SANFORD. OK. How about the—I guess what I am looking for are cost savings. So you got 47,000 buoys. You are spending, I guess, close to $1.5 billion in maintaining all of that. Is there a way, given the way that technology has changed, such that you maybe don't have to do as many buoys as you used to?

Admiral THOMAS. Well, thank you for the question. I mean we are always looking to optimize our physical aids constellation, and we have a process whereby we analyze where they are and whether or not they need to be there. And that involves a great deal of stakeholder input. The majority of our stakeholders on the waterways want to keep the physical aids in place, and it is very difficult to remove even one or two aids although, you know, we are doing the studies that we need to do in order to optimize the physical aids.

But even more importantly, we are studying how to modernize our physical aids, so that they are more cost effective, they can stay on station longer, they require less maintenance. And that is really the way ahead for physical aids, as opposed to a concerted effort to reduce the number of aids out there. It is really to make the ones that are out there more efficient so that we can maintain it less expensively.

Mr. SANFORD. Thank you, Mr. Chairman.

Mr. GIBBS. Mr. Maloney?

Mr. MALONEY. Thank you, Mr. Chairman.

Admiral Thomas, I just wanted to ask you a couple of questions about some activity that is going on in the—proposed activity that is going on in the Hudson River Valley area of New York that I represent.

You know, first, let me just say thank you for your service, thank you for the work that the Coast Guard does. I think all of us really appreciate how difficult and how important the mission is.

I wanted to draw your attention to a matter of great local concern, which is a proposal to create 10 new anchorage sites along the Hudson River. You have a rulemaking process that is underway right now. We are talking about sites from Yonkers, New York, up to Kingston. We are talking about over 1,000 acres of the river, 43 new sites. These are massive oil barges that would be docked and anchored in an archipelago that would stretch for miles up the Hudson River, creating, effectively, an oil pipeline in the center of the river. This would be in addition to the massive num-

ber of oil trains and oil shipments that are occurring along the CSX line on the west bank of the Hudson River.

So, this is generating, as you might imagine, intense local concern that crosses all sorts of party lines and all sorts of layers of Government. You have had people from the Democratic mayor of Yonkers say this is going to destroy their waterfront revitalization program, you see the conservative county executive of Westchester agreeing with him. Same is true for the Republican county executive of Duchess County, the Democratic county executive of Ulster County, groups like River Keeper and Scenic Hudson that are worried about the river.

And here is the point. The point is that we believe this is a solution in search of a problem, that there is no need for these additional anchorage sites for several reasons.

First, they already exist, they are simply spaced differently.

Secondly, they are predicated on the notion that there will continue to be a massive increase in the number of oil shipments required down the Hudson River when, in fact, the significant compression in the price of oil globally has created a glut, and we have seen a reduction in shipments, so that the infrastructure that has been contemplated may not be in any way necessary. And yet we are moving aggressively forward on this process.

Now, I want to thank you for responding to my request and others' to extend the comment period for this through December. That is a great first start. But I would really like to draw your attention to it because the fact is that this is a bad idea. This is not something we need. We don't want it. And we want the process to take into account the intense local opposition to this from all corners of all communities in the Hudson Valley.

So, I just want to take the opportunity today to draw your attention to that, and ask for your commitment that when the public hearings occur, that, one, they will occur in a early and timely way, and that they will be local, and that they will take into account as many as these local viewpoints as they possibly can, because at this point in the process I can tell you that the people in the Hudson Valley feel as though their voices have not been heard on this proposal, and they are very concerned with the rate at which it is moving.

So, we appreciate the additional time to comment, but I would really like your commitment on really including local voices in the public hearings that should occur locally, and the need to happen sooner, rather than later.

Admiral THOMAS. Congressman Maloney, thank you for bringing that issue to my attention. I am very much aware of it, and I will say that, as a previous captain of a port myself, I am very sensitive to local issues and the intense interest in what happens on local waterways.

The increased activity on the Hudson River is a symptom of the increased pressure on our Marine Transportation System. The Coast Guard is trying to manage the risks. The anchorages themselves, as you point out, don't create the increased vessel traffic. Those anchorages are one means—just one means—that we are exploring to manage the increased risk associated with more crude oil moving down the river and more products moving up the river.

I have spoken with the district commander, Admiral Steve Poulin, in fact, just yesterday about this topic. He is committed to full and open dialogue with regard to this regulation, and he is totally open to all the alternatives that are out there to help manage this risk. So we can commit to you that there will be plenty of opportunity for comment, not only to the record, but also through public meetings.

Mr. MALONEY. Thank you very much.

Yield back, Mr. Chairman.

Mr. GIBBS. Thank you. I got some more questions.

Mr. Belk, what is the process that the Corps uses to determine when they do surveys in the channels for dredging? You know, is it a routine process, where you know you are going to have to go in and check it? Or do you get information from the vessel operators in the industry? Can you just kind of expound about how you go about that, how the court goes about that?

Mr. BELK. Yes, sir. Yes, sir, Mr. Chairman. Thank you for the question.

Our survey approach will depend on a couple of things. It will depend on the use of that waterway, or that harbor, or that channel, and it will depend on the shoaling patterns of that channel. What that means is, on a very few projects, we will perform surveys daily. But on most we will perform them weekly or monthly. On some we will do it even once a year, depending again on shoaling patterns and on the tonnage that moves through that harbor.

Having said that, we also are in regular daily communications at our operational level with the towboat industry and with the Coast Guard. So if there are any anomalies that pop up between surveys, or that were overlooked in a survey, we have means to get visibility of those very quickly, and respond appropriately.

Mr. GIBBS. Well, I think you are prepared to answer this question about the Port of Cleveland. What is the status on that survey?

Mr. BELK. Yes, sir, I am tracking that concern of yours. The Corps has allocated funding to conduct maintenance dredging in Cleveland Harbor, but it has not dredged the harbor yet in 2016. The Corps has completed three surveys of Cleveland Harbor navigation channel to date. A fourth survey is scheduled to be completed this week.

Results from the previously completed surveys indicate that the channel is navigable without restrictions and, therefore, dredging is not necessary at this time. But we will see what our surveys indicate this week. The available depth is 23 feet for water maritime users, which meets the authorized depth. We will continue to monitor those conditions into the future.

Mr. GIBBS. Yes, it is just kind of amazing to me, because I know they dredge it twice a year in the past, in the spring and fall, so it is just, you know—maybe with some of the things that port has done and the Corps has done to improve the situation—or maybe this stuff is starting to work, I don't know. At some point—maybe it was the weather, I don't know. But——

Mr. BELK. Yes, sir.

Mr. GIBBS. Being tentative——

Mr. BELK. I think historical dredging has been very beneficial. I think if you look at the level of the Great Lakes, they have increased slightly in recent times, so that is helpful. And, frankly, the big factor, I think, is shoaling patterns in Cleveland Harbor are lower than they typically have been. So I think we are benefitting from all three of those factors.

Mr. GIBBS. A little bit about the hydrographic data, does the Corps have the authority to acquire that from privately contracted entities, or does the Corps do it all?

Mr. BELK. Yes, sir. The Corps uses both approaches. We have in-house hydrographic survey capability that we deploy, and we also leverage the private-sector surveying capacity.

This fiscal year we are going to invest about $53 million with the private sector to help us with both hydrographic and topographic surveying of our infrastructure and our channels.

Mr. GIBBS. You know, we talk a lot about the inland waterway navigation system and the average age of the locks and dams on that system. Where do you see the most acute place where commodities or industries might be affected? Is there one place on the inland waterway system that is really a concern to the Corps, a choke point?

Mr. BELK. Sir, I think we take a global or a system view of our inland waterways transportation system, and a risk-informed view of how we apply funding, both for operation and maintenance and for capital investments.

I also really want to thank you and the subcommittee for the authority you gave us in 2014 WRRDA to develop a capital investment strategy with the navigation industry that the Secretary of the Army was able to transmit to the Congress earlier this year. I think that has been very helpful and important to shape what our investment priorities need to be, so that the Congress can have that as they make decisions on what level of investment they want to make. They will know that it is going to buy down the most risk, and have the best positive effect on our inland waterways.

Mr. GIBBS. Well, I appreciate that. I am a little concerned about the administration's proposed budget. You know, this last fiscal year—and, like you said, in WRRDA 2014 we took Olmsted kind of offline and changed how we funded that, and we started the projects, I think it was two lock projects on the Lower Mon that have started.

But my understanding on the administration's proposed budget, that curtails that funding. And, of course, the whole concept was to start the Lower Mon projects and move to the Kentucky and the Chick locks.

What's the status—if the funding is not there, if we went by the President's proposal, if I understand it right, is the work going to stop there at the Lower Mon projects, or is it going to be just dragged out and, you know, kind of funded a penny at a time? What is the status? What is going to happen with those projects, moving forward? Because the plan was, when we did this, was to get Lower Mon started and move to Kentucky and move to Chicka locks in Tennessee. And so what is the status, if Congress adopts, I guess, the President's budget?

Mr. BELK. Yes, sir. Thank you, Mr. Chairman, for that question. It is very important to the Corps and to inland waterways users.

The fiscal year 2017 President's budget proposed $225 million for the Olmsted Locks and Dam project, the highest priority in our capital investment plan. No funding is proposed for Monongahela Locks and Dams 2, 3, and 4, also known as Lower Mon, for Kentucky lock, or Chickamauga lock. The fiscal year 2017 budget amount of $225 million is below the $232 million budgeted in fiscal year 2016, but above the $160 million to $180 million that had been budgeted for construction in prior years.

The administration believes this is the appropriate amount, given the President's fiscal priorities, the Corps' Civil Works responsibilities, and the need to reduce——

Mr. GIBBS. Let me stop—ask this question.

Mr. BELK. Yes, sir.

Mr. GIBBS. OK. On the Lower Mon you—if I heard you right you said the President's budget does not provide the funding for the fiscal year 2017. Right? You said that, right?

Mr. BELK. Yes, correct.

Mr. GIBBS. What happens—do we have contracts that are going to expire in that time? Or is there already a contract to work past that time so the funding is there?

Mr. BELK. Yes, sir. So, again, the President's budget was $225 million. Olmsted was a primary focus of those dollars. But the Congress this year, in the appropriation process and under the workplan process, we are able to invest some $404 million to our inland waterways construction account.

What that means is we will not only address Olmsted at a capability level of funding, we are also able to pick up and continue working Kentucky lock, Lower Mon, and Chick lock with the funding provided by Congress in fiscal year 2016.

Mr. GIBBS. OK, thank you. What's the responsibility of the Corps to survey and maintain the channels, the approaches, and the berths primarily used by the Coast Guard, Navy, and Federal Government? How does that interaction work between the Coast Guard and the Navy and—to get these surveys done for the channels that are important for them?

Mr. BELK. Yes, sir. Thank you for that question. The Corps of Engineers surveying authority devolves from project authorities that the Congress gives us for navigation channels for commercial navigation. We execute those with dollars provided by Congress.

We do have some authorities as a byproduct of those project authorities to do some of the surveying you described, but in other cases we don't. Where we don't, we can take funding from other agencies to perform those surveys that are outside the authority that Congress has given us for such surveys.

Mr. GIBBS. I think—back to the hydrographic survey—I think the Corps has about 100 vessels for doing those surveys. What condition are those vessels in?

Mr. BELK. Sir, it varies. But on balance, and across the fleet, they are older. I don't have an average age. I can get that back to the subcommittee. They are older, and we are—again, like our sister agencies here—looking at recapitalization challenges as they continue to age.

Mr. GIBBS. Of course, I guess you have got the option of doing more private contracting. You could do some of that anyways for the surveys, right?

Mr. BELK. Yes, sir. We do.

Mr. GIBBS. Are there many interruptions in transferring the data between NOAA and—or the Coast Guard? And if there was, has there been any delays that—this data we talked about that the Corps does, working with NOAA and the Coast Guard?

Mr. BELK. Sir, we have not experienced any. We are required by statute to provide our surveys to NOAA within 60 days of obtaining them for our channel surveys, and we have been meeting those requirements. NOAA uses those surveys, in addition to many other sources of data, to execute their charting responsibility.

Mr. GIBBS. If my memory serves me right, was there an issue in Corpus Christi on this?

[Pause.]

Mr. GIBBS. OK, I am done. I don't know if you got any followup questions, Mr. Garamendi.

Mr. GARAMENDI. Thank you. I am going to take this in a somewhat different direction for a few moments, an issue that this committee, our subcommittee, has dealt with on and off over the years. And it is the salvage and marine firefighting regulations.

The waivers for the response systems, including ships and other equipment, those waivers expired in February of 2015. Now, those are waivers given to private sector, so that they had time to invest in the necessary equipment and ships and other items to deal with pollution and—as well as fire and safety. This question, therefore, goes to the Coast Guard.

Where are we with assurances that these private organizations actually have the equipment and are able to respond?

Admiral THOMAS. Congressman, I am not the best Coast Guard representative to address that issue. It falls under my colleague's response portfolio. I am familiar with the requirements for salvaging marine firefighting, the plans and the waivers. I don't have a current status, so I would have to take that for the record to get back to you with details.

Mr. GARAMENDI. I thought that might be the case, the answer, but I threw it out there because we would like to get at this and have some assurances that these response mechanisms are actually in existence. And so, if you could run that back through the system and come back to us with an answer——

Admiral THOMAS. We will be happy to do that.

[The information follows:]

A long and collaborative development process led to the identification of distinct salvage and marine firefighting (SMFF) services for assessment, stabilization, and special operations. This consultative process resulted in regulations that went into effect in 2009, with a 2011 compliance date, requiring tank vessels to plan for SMFF services. In 2013, SMFF services became a required component for non-tank VRPs as well. Today, all vessels which must have a VRP are required to plan for SMFF response services.

The Coast Guard instituted a verification program to review SMFF resource providers' capabilities and planning from 2011 through 2013. The review and subsequent corrective actions, which included the use of temporary waivers, improved the overall quality of submitted information. To

date, corrective actions have been made by the SMFF resource providers and no waivers remain in place.

Mr. GARAMENDI. I have a series of five written questions that I would like to submit to the record and get that on the record.

Mr. GIBBS. So ordered.

I want to thank our panel for their distinguished service and for being here today. And also be aware—and I am sure you are aware—of how important it is to adopt all this new technology, get our inland waterway system and our ports all working, and work together with our intermodal systems for our national security and also our economic security.

So thank you for your service, and this concludes the hearing.

[Whereupon, at 11:31 a.m., the subcommittees were adjourned.]

STATEMENT OF
THE HONORABLE PETER DEFAZIO
SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION AND
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT
JOINT HEARING ON "FEDERAL MARITIME NAVIGATION PROGRAMS: INTERAGENCY COOPERATION AND TECHNOLOGICAL CHANGE."
SEPTEMBER 7, 2016

Chairman Hunter and Chairman Gibbs, thank you for scheduling this morning's joint hearing on Federal maritime navigation programs.

The surveying and charting of the navigable waters of the United States is one of the oldest functions of the Federal Government. While often overlooked and underappreciated, this function remains just as important today as it was in 1807 when Thomas Jefferson signed the law authorizing the survey of the U.S. coast.

And if anything, the tremendous growth in global commerce over the last half century, and its reliance on a safe, efficient and reliable marine supply chain, demand that marine navigation programs remain a core function of the Federal Government.

That function now is needed in the Arctic.

President Obama recognized that safe marine operations and transportation must be established in the Arctic as part of his September 1, 2015, announcement of new investments to enhance safety and security in this dynamic and evolving region.

Climate change is readily apparent in the Arctic, especially with the rapid loss of Arctic sea ice. One consequence of the warming Arctic is the opening of Arctic Ocean transportation routes which is likely to stimulate a dramatic increase in oceangoing sea traffic there. Even today, cruise ships such as the *Crystal Serenity* are venturing farther north. Most important, projections show routine Arctic marine transit is anticipated by approximately 2020.

In response to this rapidly evolving circumstance, the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Coast Guard have been charged with the task of mapping and charting navigation routes in the Bering, Chukchi, and Beaufort Seas, regions for which existing maps and charts are nonexistent or outdated.

Additionally, NOAA, the U.S. Geological Survey, and the State of Alaska will use satellite data for the completion of shoreline and near-shoreline coastal mapping. In the near future, NOAA will modernize and install additional instrumentation on the Arctic coast

to monitor the effects of climate change and enable safe marine operations and transportation— including a permanent National Water Level Observing Network station to monitor sea-level rise, and up to six temporary water-level stations.

Also important, President Obama recognized the absence of any deep-water harbors in the U.S. Arctic capable of providing shelter to vessels operating in, or transiting through, the U.S. Arctic region. It is my understanding that the U.S. Army Corps of Engineers began a process in 2015 to evaluate the feasibility of deepening and extending Nome's harbor capabilities, but much more needs to be done.

Mr. Chairman, we need to know the status of these affairs. Our model projections have always been proven to be far more conservative than actual observed environmental change. If we sit and do nothing, we stand to lose out in a region of growing geopolitical, security and economic importance. And that is an outcome we cannot allow to happen.

I want to welcome and thank our witnesses for their participation this morning. I look forward to hearing your testimony. Thank you.

STATEMENT OF
THE HONORABLE JOHN GARAMENDI
SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION AND
SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT
JOINT HEARING ON
"FEDERAL MARITIME NAVIGATION PROGRAMS: INTERAGENCY COOPERATION AND TECHNOLOGICAL CHANGE"
SEPTEMBER 7, 2016

Thank you, Mr. Chairman, and welcome back as we begin what will be a very busy month of September. And thank you also for scheduling this morning's hearing – this time with our colleagues from the Water Resources and Environment Subcommittee – as we continue our oversight into the future of maritime navigation.

The timing of this hearing could not be better. Only last week an article ran in the Wall Street Journal, entitled, "Pilotless Sailing is on the Horizon – Freight carriers aims to optimize use of vessels. Cut their fuel and labor costs."

This article revealed that right now ship designers, operators and regulators are gearing up for a future in which cargo vessels sail the oceans with minimal, or even no crew. And it foresees a day in the not too distant future when technologies long-used to improve commercial airline operations begin migrating to ships.

Coming less than two weeks after the release of the FAA's pioneering rulemaking governing the commercial use of aerial drones,

this Wall Street Journal article reinforced in my mind that the dawn of a new age of fully-automated or even autonomous transportation systems is upon us.

The implications of such a transformation could signal the greatest innovation in marine transportation since the conversion from steam to diesel-powered propulsion systems, or the advent of containerization. Yet, are we fully grasping the scale and complexities before us?

The tremendous size and expense of the newest generation of mega-container ships, such as CMA CGM's *Benjamin Franklin*, which alone can carry up to 18,000 containers, make the financial, commercial and environmental risks enormous. And for a global maritime industry that sustains a reliable and efficient global supply chain that fuels the U.S. economy, failure could have devastating, and long-lasting consequences.

Additionally, this transformation will only increase our reliance on electronic data, virtual aids to navigation, and other networked navigation technologies such as radars, chart plotters and gyrocompasses that rely on position, navigation and timing signals provided by our GPS satellite system.

But is this wise considering the vulnerabilities of GPS and the absence of any reliable back-up PNT signal should GPS fail?

The fact of the matter is that Coast Guard has identified GPS vulnerability as a cybersecurity threat. Moreover, Coast Guard Commandant, Admiral Paul Zukunft, has said that GPS is "a single point of failure for critical infrastructure."

In closing, Mr. Chairman, I know that you share my view that the Congress must act to compel the Federal Government to finally commit to build and operate a reliable land-based back-up signal for GPS.

For it would seem to me that if a future of automated or unmanned commercial ships sailing the world's oceans is soon to be a reality, we should first act to ensure that these vessels not sail blindly. Thank you, and I look forward to this morning's discussion.

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TESTIMONY OF
REAR ADMIRAL PAUL THOMAS
ASSISTANT COMMANDANT FOR PREVENTION POLICY

ON
"FEDERAL MARITIME NAVIGATION PROGRAMS"

BEFORE THE
HOUSE COAST GUARD & MARINE TRANSPORATION (CG&MT) SUBCOMMITTEE
AND HOUSE WATER RESOURCES & ENVIRONMENT (WR&E) SUBCOMMITTEE

SEPTEMBER 7, 2016

Good morning Chairman Hunter, Ranking Member Garamendi and distinguished Members of the Subcommittee. It is a pleasure to be here today to update you on the Coast Guard's efforts to modernize the marine navigation system and enhance mariner situational awareness.

Maintaining Aids to Navigation (ATON) is the U.S. Coast Guard's oldest mission, tracing its roots to the ninth law passed by Congress in 1789. As the multi-mission, maritime service responsible for the safety, security, and stewardship of U.S. waterways, the Coast Guard maintains the aids that guide mariners through the U.S. Marine Transportation System (MTS), one of the largest systems of ports and waterways in the world. The MTS is a complex, inter-woven, and intermodal series of coastal, intracoastal, and inland waterways that travel across state and national borders, linking our highways, railroads, and pipelines to ports around the world. The U.S. MTS consists of 25,000 miles of waterways that connect approximately 1,000 harbor channels, over 300 ports, and 3,700 terminals. This vast and vital system enables passenger and cargo movements for more than 68,000 vessel calls and facilitates the movement of maritime cargo that accounted for over $4.5 trillion of our nation's economic activity in 2015. The U.S. MTS also includes more than 1,500 miles of maritime border with Canada that link major population centers to the Atlantic Ocean through the Great Lakes and the St. Lawrence Seaway System. More than 73 million Americans are involved in recreational boating, maritime trade, and marine fisheries.

The Coast Guard is making efforts to adapt our service to support the increasing complexities of the MTS. Modernizing navigation safety services the Coast Guard provides to the mariner has been a hallmark of the ATON program since we switched from whale oil lamps to tungsten bulbs.

The use of and increasing dependency on electronics and technology by the shipping industry continues to evolve. The Coast Guard will adapt to these changes by maintaining the appropriate mix of physical and electronic ATON that best serves the mariner. Sustainment and recapitalization of our servicing assets is a key element of our modernization effort.

Modernize Physical ATON System:

A key component to modernizing the marine navigation system lies with the modernization of our physical ATON constellation. The cost of the physical ATON constellation is driven by the maintenance associated with large steel buoys and the assets required to service them. The Coast Guard is seeking to modernize large physical ATON by leveraging technological advances in buoy construction and mooring solutions, while streamlining our logistics supply chain.

For example, the Coast Guard Research and Development Center is currently evaluating over fifty submissions for a new mooring solution aimed at determining a more effective, less costly, and more environmentally friendly way to anchor our buoys in position. On the Great Lakes, we are evaluating the effectiveness of composite (plastic), ice resistant buoys. These buoys are designed to withstand the harsh winter environment and remain on station year round. If successful, these aids could cut the number of visits by the servicing assets in half. We are also evaluating the effectiveness and visual signal and long term service life costs of these buoys.

In an effort to reduce logistics costs associated with maintaining our physical ATON system, we are standing up a new Waterways Operations Product Line, which will provide for a centrally managed and funded standardized approach to aid construction and refurbishment. The new product line will provide for more efficiencies in logistics, maintenance, and support of our physical system by reducing service costs and increasing aid life cycle.

Incorporate Automatic Identification System (AIS) ATON into System Design:

The current design of the U.S. ATON System is based on the use of physical ATON, visual bearings, and radar ranges to determine a ship's position. As part of its modernization effort, the Coast Guard has augmented the physical ATON constellation with 417 electronic ATON via our Nationwide Automatic Identification System (NAIS). The Coast Guard has taken a very judicious approach to incorporating this new technology into our ATON system to ensure the mariner is comfortable with using this technology, and we have properly evaluated its effectiveness and reliability in mitigating transit risk through the MTS. In some cases, the use of electronic ATON has significantly reduced the Coast Guard's response time to missing or discrepant aids from days to minutes. A mix of physical and electronic ATON in ice prone waters has improved the resiliency of the system in winter months when physical aids have been pushed under the ice and concealed from the mariner.

On March 1, 2016, the AIS carriage requirement expanded to include nearly 6,000 additional vessels to the over 4,500 vessels previously required to carry AIS. This expanded rule, along with our recent efforts to allow electronic charts in lieu of paper charts, is helping bring the technology to use electronic ATON and enhanced Marine Safety Information (eMSI) to the wheelhouse.

While the Coast Guard does not believe electronic aids will completely replace the need for physical ATON, a proper balance among the two will improve efficiency, effectiveness, and resiliency throughout the system. Through our analyses, the Coast Guard will optimize the appropriate mix. Lessons learned from the operation and maintenance of the ATON system and feedback provided by waterway users will inform the Coast Guard's waterway design criteria and policy.

Sustainment and Recapitalization of Assets:

Notwithstanding the advent of electronic ATON, the Coast Guard expects that the requirement for physical aids and their on-going maintenance will continue to be a vital component to safe navigation. Given this, the Coast Guard is planning to recapitalize our aging Inland and Construction tender fleets. At an average age of 52 years old, the entire fleet is well past the end of their designed service lives, in some cases, well over 60 years old; yet they are responsible for the establishment or maintenance of over 27,000 ATON, which accounts for more than 56 percent of the overall constellation. To address immediate obsolescence issues, the Coast Guard is completing the Inland River Tender Emergency Subsystem Sustainment (IRESS) project to serve as a bridging strategy to maintain the operational capabilities of river and construction tenders until a viable, long-term replacement is identified. To date, work has been completed on 22 of the 23 cutters under this project.

In addition to our inland fleet, the Coast Guard's 225 foot seagoing buoy tenders, and 175 foot coastal buoy tenders are at or past their midlife, requiring depot-level maintenance to ensure they can continue to safely sail and effectively execute their mission sets. A multi-year Mid-life Maintenance Availability is currently underway at the Coast Guard Yard for our seagoing buoy tenders. The Coast Guard also has begun preliminary Survey and Design actions to identify a similar overhaul package for the coastal buoy tenders. The Service is grateful for this Subcommittee's strong ongoing support of the sustainment and recapitalization of these critical fleets.

Review Current System:

To successfully modernize the marine navigation system, the Coast Guard continues to explore ways to optimize the mix of both physical and electronic ATON. The benefits to the Coast Guard of such optimization could include increased workforce productivity, more effective service delivery and improved port resiliency. This long-term effort is evaluating revised waterway marking design standards and transmission of eMSI through immediately accessible electronic methods. Working with Federal partners and maritime stakeholders to better understand the current navigational needs, we will ensure the end product meets navigational safety requirements.

To determine navigational safety requirements, we are taking a systematic and holistic approach that considers channel framework, user capabilities, training and carriage, available technology, and environmental considerations in addition to stakeholder input. The Coast Guard uses the Waterway Analysis and Management System (WAMS) to plan and implement our ATON program to enhance the safe navigation upon a waterway. During the WAMS process, the Coast Guard solicits waterway user input, assesses current ATON configurations, and reviews nautical literature, such as charts. Using the current WAMS process, we are conducting a series analyses to inform a national level of service policy, updated to be regionally consistent and predictable. The levels of service will continue to define where and how the Coast Guard will provide ATON to meet today's requirements throughout the U.S. MTS.

We have recently completed an analysis on the Atlantic and Gulf Seacoast System, which is an unrestricted waterway without specific boundaries or controlling depth. The analysis covers the eastern seaboard from the U.S. Canadian Border south along the Gulf of Mexico to the U.S. Mexican border.

Portions of the Seacoast ATONs were established based on mariner requirements that predate modern navigation technologies and methods, including Global Positioning System (GPS), electronic chart systems, and AIS. We intend to conduct a similar study on the Pacific Seacoast System this upcoming fiscal year, and consolidate the results for Seacoast systems as a whole.

This will allow us to adjust our current framework and give our District Commanders the tools they need to appropriately and consistently mitigate the risk throughout these systems. Additional WAMS analysis will be conducted on the Deep Draft and Shallow Draft Systems, the Intracoastal Waterway, and the Inland Waterways/Western Rivers. Taken together, this will provide a consistent approach to service throughout the entire U.S. MTS that accounts for the increased complexity, while minimizing our environmental footprint.

Improve public notification of ATON changes and proposals:

The Coast Guard submitted a report to Congress in August entitled *Discontinuance of an Aid to Navigation*, specifically addressing ways to improve our public notifications on ATON changes and proposal. In it we recognized the importance of improving public awareness and engagement when changes are considered for any maritime aid to navigation.

In this spirit, we worked with our Navigation Safety Advisory Council to identify best practices and update our policies The most significant changes include lengthening the time the Proposed Change is published, and developing an official Coast Guard checklist form to ensure standardization of outreach efforts throughout all Districts. The Coast Guard is pursuing additional process improvements that leverage available technology to complement current outreach efforts. Specifically, the Coast Guard is exploring new technologies that allow mariners to view proposed ATON changes via mobile applications, web based applications and electronic navigation systems. These improvements could both expand the distribution of marine information products and allow for marine information data to be integrated into route planning software.

The effective and timely notification of ATON changes is essential to ensuring the safety of waterways users and the reliability of our MTS. These policy changes and future enhancements will further modernize the distribution of marine information products.

Modernize Delivery of Marine Safety Information:

Marine Safety Information (MSI) provides critical information to the mariner during voyage planning and while transiting the MTS. The Coast Guard has made strides to update and augment the delivery of this service for the modern waterway user. Currently, MSI is provided to the public via two methods: Local Notice to Mariners posted online via the U.S. Navigation Center's website, and by broadcasting more time sensitive information via VHF–FM marine band radio. While this meets our requirement to provide the information to the mariner, it is not the most practical, efficient, or effective method given the common, modern means of information sharing. The current methods require the mariner to read lengthy documents for specific pieces of information and to monitor the appropriate radio frequency at all times. In order to modernize the delivery of this information, the Coast Guard is seeking ways to provide these notices to mariners in a real-time, electronic, user-friendly format that can be viewed on an integrated charting system. In pursuit of this vision, we are currently providing ATON discrepancy, temporary ATON changes, and iceberg locations, in machine readable. electronic formats online. We have connected our IT systems with the National Oceanic and Atmospheric Administration's Physical Oceanographic Real Time System, and we are broadcasting real time meteorological and hydrographic information through

our NAIS network in Tampa and on the Columbia River. Working closely with the Army Corps of Engineers (ACOE), we are broadcasting similar data, as well as lock queue information along portions of the Ohio River.

We have worked closely with bridge owners and Pilot's associations, and have developed policies to allow lift bridges to broadcast open or closed information via private, self-contained, AIS transmitting units. These advancements in MSI delivery will streamline the voyage planning process, and allow for an improved and more effective flow of information and marine traffic.

Nationwide Differential GPS:

As technologies emerge, the Coast Guard is considering new methods for ensuring safe navigation. At the same time, we must continue to examine legacy systems to ensure that the benefit from their continued operation is greater than the cost to maintain them. Services such as Differential GPS (DGPS), while useful to a narrow but important, may not be the best system for meeting mariner needs in the 21st century. DGPS was developed by the Coast Guard to improve accuracy in positioning ATON when the original GPS signal was transmitted for civil users with an imbedded intentional error. This induced error was known as Selective Availability. It decreased the position accuracy of GPS from five meters to approximately 100 meters. By using static reference stations to calculate corrections to the GPS signal received from the satellites, DGPS is able to retransmit a corrected GPS signal to users with DGPS receivers, providing accurate positioning information to within approximately three meters. In May of 2000, the U.S. Government turned off Selective Availability, providing all users of GPS receivers with the maximum accuracy available from the GPS satellites.

Over time, a number of factors have contributed to the declining public use of NDGPS, including lack of a carriage requirement, technological advances in GPS, and limited availability of consumer-grade DGPS receivers. Working with the Department of Transportation and ACOE, which both have responsibility for terrestrial uses of DGPS, the Coast Guard and the Department of Homeland Security published a Federal Register Notice in August 2015 and sought public comments on a proposal to shutdown and decommission 62 of the then-existing 84 NDGPS sites. Based on input from the public and waterway users along with our subsequent review, we shut down nine Coast Guard maritime and 28 inland Department of Transportation DGPS sites on August 4, 2016. This streamlined system will still provide DGPS services for precision navigation where needed. We will continue to assess DGPS's value to the mariner as the navigation system evolves.

Conclusion

The modernization of our marine navigation systems is challenging and complex, and requires continuous collaboration among all maritime stakeholders. The interest and support of Congress in this ongoing endeavor is of great benefit to the Coast Guard and our waterway partners. Working closely with NOAA and USACE, and in full consultation with our waterway users and stakeholders, we will adapt our portfolio of navigation services in order to meet these new requirements, and provide for a safe, efficient, and more resilient MTS.

Thank you for the opportunity to testify today, and for your continued support of the United States Coast Guard. I look forward to answering any questions you may have.

Question#:	1
Topic:	Advanced Data Collection Methods
Hearing:	Federal Maritime Navigation Programs: Interagency Cooperation and Technological Change
Primary:	The Honorable John Garamendi
Committee:	TRANSPORTATION (HOUSE)

Question: Arctic transit routes continue to grow in importance due to increased vessel traffic in the region as well as expanding exploration efforts brought on by international interests in the oil, gas and mineral deposits of the area. This increased activity in the Arctic necessitates a more complete understanding of the region and seafloor through more efficient data gathering techniques than ones currently employed, such as shoaling.

What requirements must be met in order to advance the data collection methods and technologies employed in charting the Arctic seafloor?

Response: Modern nautical charts provide the foundation for safe navigation. In support of safe navigation, the National Oceanic and Atmospheric Administration (NOAA) holds primary Federal responsibility to perform hydrographic surveys in U.S. waters (including the Arctic) and provide nautical charts and related hydrographic information. To that end, NOAA's Office of Coast Survey Marine Chart Division has recently released the U.S. Arctic Nautical Charting Plan (Dated August 10, 2016) supporting sustainable marine transportation in Arctic Alaska and is available at:

http://www.nauticalcharts.noaa.gov/mcd/docs/Arctic_Nautical_Charting_Plan.pdf

While hydrographic survey and nautical charting in the Arctic does not require fundamentally different methods or technologies than in other areas of the U.S., the extreme conditions of the Arctic pose unique operational challenges and entail higher costs. Unique operational challenges include a more limited survey season, long transit times to survey sites, and more extreme marine weather. While ship-based multibeam sonar surveys remain the "gold standard" of data acquisition for nautical charts, NOAA is exploring the use of alternative data sources, such as satellite-derived bathymetry, airborne LIDAR and crowdsourced bathymetry to augment charting efforts. However, NOAA is not currently able to apply these data directly to charts. In the future, NOAA may be able to use airborne LIDAR data for charting with additional development of its vertical datum transformation tool (VDATUM).

Question#:	2
Topic:	Oil Pollution Act of 1990
Hearing:	Federal Maritime Navigation Programs: Interagency Cooperation and Technological Change
Primary:	The Honorable John Garamendi
Committee:	TRANSPORTATION (HOUSE)

Question: The Oil Pollution Act of 1990 requires vessel operators to have vessel response plans to prevent environmental damage from spills. In 1993, the U.S. Coast Guard (USCG) issued initial Salvage and Marine Firefighting (SMFF) regulations that required vessel response plans (VRP) to ensure, by contract or other approved means, the availability of private personnel and equipment to remove or prevent a pollution discharge, including those resulting from fire or explosion. Finally, after 15 years and innumerable delays, the USCG issued a final SMFF rule (33 C.F.R. Part 155, Subpart I) with an effective date of January 30, 2009. This rule included a provision for waivers to allow for sufficient time for private industry to secure the significant funding required to build resources capable of responding to offshore incidents to "save lives and property". This waiver authority expired in February 2015. Recently, the USCG has embarked on a verification process including tabletop exercises to determine whether adequate resources are available to meet SMFF requirements.

Assuming that requirements under 33 C.F.R. Part 155, Subpart I now have been complied with, please provide a list of SMFF response resources that have been built and are in service to comply with the regulation? How many of these assets were built with actual firefighting capabilities and are currently ensured by contract to be available to respond to an offshore incident?

Response: The Coast Guard does not maintain a list of SMFF response resources. The Coast Guard does not track the construction of vessels for SMFF purposes. The regulation requires that individual vessel owners or operators identify SMFF resource providers and certify their adequacy (33 C.F.R. § 155.4050(a) and (d)).

In 2011, the Coast Guard established a voluntary program for incorporating contracted SMFF service information into VRPs by reference to core geographic specific appendices (core GSAs). SMFF core GSAs identify a given primary SMFF resource providers' sources of resources in a COTP zone that are able to meet planning standards for timely response and delivery of services. A vessel owner or operator may incorporate pre-reviewed SMFF core GSAs into their VRP, by reference.

As a result of this effort, four SMFF resource providers voluntarily submitted core GSAs to the Coast Guard for review of their documentation for up to 19 services in up to 41 Captain of the Port (COTP) zones. The Coast Guard conducted an SMFF service-specific verification of the SMFF resource providers' plans to achieve planned endpoints and timeframes at the Captain of the Port (COTP) level. In addition to the service-specific

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verification conducted at the COTP level, SMFF core GSAs are also reviewed against regulatory requirements for errors and omissions on a quarterly basis. To date, more than 97% of all VRPs identify SMFF core GSA providers.

Question: Since waivers expired in 2015, what actions has the USCG taken to ensure VRPs are compliant with 33 C.F.R. Part 155, Subpart I? What sanctions do vessel owners/operators potentially face if they are unable to verify that resources listed in respective VRPs are ensured and available by contract to respond to an offshore incident?

Response: The Coast Guard's primary means of verifying VRP compliance with 33 C.F.R. Part 155, Subpart I, is through the validation of existing contracts and funding agreement(s) between the vessel owner or operator and their primary SMFF resource provider(s). These documents are submitted for review along with VRPs. A VRP must also include a statement from the vessel owner or operator that certifies the adequacy of the SMFF resource providers contracted in their plan. If the above cannot be established, a VRP would not be approved.

Question: How does the USCG determine if a vessel or other response resource is available for a SMFF response? What does "available" mean?

Response: There is no Coast Guard classification program for SMFF resources. Per the regulations, the responsibility to contract adequate resources is clearly vested in the vessel owner or operator, who certifies to the Coast Guard that their contracted resources are adequate and able to meet response timeframes (33 C.F.R. § 155.4050(b)).

Question: Do the tabletop exercises conducted by the USCG for verifying the adequacy and availability of SMFF resources guarantee that such resources will respond immediately at the time of an actual incident?

Response: The Coast Guard conducts planned and unannounced exercises in an effort to verify the adequacy and availability of SMFF resources and their ability to meet SMFF planning criteria including endpoints and timeframes. The objective(s) of these exercises and the ongoing SMFF verification effort are to validate that vessel owners or operators have effectively planned to meet response needs within the planning standards outlined in the regulations. There is no regulatory requirement for a resource to be "immediately" available.

Question: Do SMFF response resources contracted to fulfill VRP requirements have primacy over other contracted arrangements for the use of the response resources? In

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Committee:	TRANSPORTATION (HOUSE)

other words, does the USCG expect that listed resources in a VRP are to be immediately available for a response? If a listed resource is not available to immediately respond to an incident because of prior commercial obligations, is this acceptable to the USCG?

Response: The regulations require a vessel owner or operator to choose one or more SMFF resource provider(s), note which provider is primary, and certify their adequacy. The plan holder must ensure, by contract or other approved means, that response resources are available. There is no regulatory requirement for "immediate" response or "immediate" availability, only that identified resources are available to meet the planning criteria outlined in the regulations. Additionally, the regulations require the owner or operator to follow the VRP in the event of an incident. Deviations from a VRP can be approved by the cognizant Federal On Scene Coordinator if the deviation serves expediency or efficacy of the response.

Question: Once the verification process is completed, what steps would the USCG take if an offshore incident occurs and no SMFF response resources listed in a VRP responds to an incident?

Response: One of the objectives of the Coast Guard verification effort is to obtain a coherent data set that can be used to determine if delivery time and/or resource gaps exist in the planning and resource laydown currently used by owners, operators, and SMFF service providers to meet the planning standards. Consequently, the Coast Guard will then be able to work with vessel owners and operators and SMFF providers on their plans to meet any identified gaps. Certainly, it is not acceptable for an owner or operator to fail in their responsibility to adequately plan for a response. If necessary, the Coast Guard will exercise its enforcement discretion in light of all facts and circumstances as per 33 C.F.R. § 155.4010(c).

Question: What situations would the USCG find acceptable for the performance of a response that fall short of the planning criteria?

Response: As no two incidents are the same, it would be very challenging to pre-identify situations that might indicate a failure in planning. As noted in the regulations, the SMFF service requirements are planning standards and might be based on assumptions that do not exist at the time of an incident. Failure to meet specified criteria during an actual spill response does not necessarily mean that the planning requirements of the Federal Water Pollution Control Act (FWPCA) (33 U.S.C. §§ 1251-1376) and regulations were not met. The Coast Guard will exercise its enforcement discretion in light of all facts and circumstances as per 33 C.F.R. § 155.4010(c).

Question#:	3
Topic:	Boat Pilots
Hearing:	Federal Maritime Navigation Programs: Interagency Cooperation and Technological Change
Primary:	The Honorable Todd Rokita
Committee:	TRANSPORTATION (HOUSE)

Question: Admiral Thomas, currently an individual must be a deckhand for five years before they can become a pilot. Given that we are starting to see a shortage of boat pilots, especially on the Ohio River and to a lesser extent the Great Lakes, is the Coast Guard considering changes to this requirement?

Response: The Coast Guard is not currently contemplating any regulatory changes to the time of service requirements for any deck officer endorsement, including first-class pilot, or for any towing vessel related endorsements, such as master, mate (pilot), and apprentice mate (steersman) of towing vessels.

Question#:	4
Topic:	Pilotage Fees
Hearing:	Federal Maritime Navigation Programs: Interagency Cooperation and Technological Change
Primary:	The Honorable Todd Rokita
Committee:	TRANSPORTATION (HOUSE)

Question: Admiral Thomas, as you know, Indiana is home to Burns Harbor, one of the busiest ports on the Great Lakes. Indiana's farmers and manufacturers rely on this important gateway to import and export goods. One of the single largest costs imposed on shipping through Burns Harbor is pilotage fees. These fees are imposed by the U.S. Coast Guard. Since the Coast Guard exercises oversight of the Great Lakes pilotage system, what steps have you taken to streamline the system and seek efficiencies?

Response: The Coast Guard has a statutory requirement to "prescribe by regulation rates and charges for pilotage services, giving consideration to the public interest and the costs of providing the services... by March 1 of each year." (46 U.S.C. § 9303(f)). As part of this process, we employ an independent third party to audit the three U.S. Great Lakes pilot associations' expenses and evaluate them to ensure they are reasonable and necessary for providing pilotage service on the U.S. waters of the Great Lakes. The Coast Guard then publishes these financial reports in the Federal Register for public review and comment as part of the annual rate-setting process. We consider these comments prior to finalizing the pilotage rates.

By statute, the Coast Guard holds a Great Lakes Pilotage Advisory Committee meeting at least once during each calendar year, or at the request of a majority of the committee members (46 U.S.C. § 9307(a)(4)). These meetings are open to the public and we consider the recommendations and discussions during these meetings to address various Great Lakes Pilotage issues, including steps to streamline the System and enhance efficiencies within the regulatory process that governs U.S. Great Lakes Pilotage - 46 C.F.R. §§ 401-404.

U.S. pilotage expenses are only one of many costs paid by international shippers conducting business in the Great Lakes. In addition to regular operating costs (fuel, labor, port fees, etc.), these foreign vessels will also pay Canadian pilotage fees, Canadian lock fees and Canadian icebreaking fees, which in total often exceed U.S. pilotage expenses. U.S. pilotage fees are often less than 10% of the aggregate vessel costs, and should be considered separately from the various fees Canadian entities impose. Last, U.S. pilotage requirements apply only to foreign vessels carrying cargo to or from Burns Harbor; U.S. and Canadian "lakers" carry their own pilots and are exempt from U.S. Great Lakes pilotage regulations.

WRITTEN TESTIMONY OF
REAR ADMIRAL SHEPARD M. SMITH
DIRECTOR, OFFICE OF COAST SURVEY
NATIONAL OCEAN SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

HEARING BEFORE THE
SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION AND THE SUBCOMMITTEE ON WATER RESOURCES AND THE ENVIRONMENT
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
U.S. HOUSE OF REPRESENTATIVES

September 7, 2016

Introduction

Good morning Chairmen Hunter and Gibbs, Ranking Members Garamendi and Napolitano, and Members of the Subcommittees. My name is Shep Smith and I am the Director of the Office of Coast Survey at the National Oceanic and Atmospheric Administration (NOAA), within the Department of Commerce. I am pleased to have the opportunity to testify today on Federal Maritime Navigation Programs: Interagency Cooperation and Technological Change, and specifically how NOAA is advancing navigation services

We appreciate the opportunity to testify at this hearing along with the U.S. Coast Guard and U.S. Army Corps of Engineers (USACE) on these critical themes as a natural follow up to the February 2014 hearing on the future of Federal navigation aids. Our agencies cooperate and coordinate on a regular basis, united in support of the nation's economic and national security.

NOAA's unique contribution to maritime navigation is to employ the latest technologies to provide mariners and others with science-based information and services on the present and future condition of the marine environment. NOAA does this through the acquisition, management and delivery of essential environmental data, which inform thousands of decisions on the safe and efficient movement of goods through our coastal ports and inland waterways every day. This information infrastructure is delivered in the form of nautical charts, real time ocean and coastal observations, positioning services, weather and water-level forecasts, and other navigation-related products and services.

The Office of Coast Survey has been the Nation's chartmaker since 1807 when President Thomas Jefferson signed "An Act to provide for surveying the coasts of the United States." Today this responsibility extends to the entire 3.4 million square nautical miles of U.S. waters from our coasts and Great Lakes to the 200-mile limit of the Exclusive Economic Zone. An enormous task, NOAA has long focused its efforts and resources on supporting safe navigation primarily for commercial shipping through its nautical charting program and maintenance of the 1,000 raster and electronic nautical chart suite. NOAA cartographers verify and chart data from over 50 different sources, including NOAA's own hydrographic surveys, contractors, U.S. Coast Guard aids to navigation, USACE navigation channel condition surveys, and locations of key port infrastructure provided by port authorities.

NOAA's Coast Survey is committed to seeking out new opportunities to more efficiently fulfill our historic mission. New technologies are an essential component of this effort and I believe we are on the cusp of a new era for delivering the accurate navigation products and services required to meet the needs of increasingly complex marine transportation. Today I will focus on the drivers shaping NOAA's navigation program for the next 20 years, and how partnerships – with commercial industry and our sister agencies – will help us support not only commercial shipping, but also commercial and recreational fishing, recreational boaters, state and local government uses, and coastal zone managers, among others. I will discuss the current and future state of electronic charting and advances we are making on data acquisition and NOAA nautical chart updates, and close with a specific look at the Arctic region.

Supporting Blue Economies for Communities and Industry

NOAA is committed to supporting the "blue economy" -- businesses that rely on the oceans and coasts. We do this in two ways. First, the information we provide to the public is critical not only to major international shipping industry, but also coastwise commerce, tug and barge, fishing, recreational boating, military and government operations, and maritime small business industries. A 2015 NOAA study, *The National Significance of California's Ocean Economy*, examined the contributions of sectors such as tourism and recreation, marine transportation, and offshore mineral extraction. Marine transportation activities alone accounted for $14.1 billion, or 31 percent, of the California ocean economy GDP in 2012. This included the transportation of cargo and passengers, port operations and the manufacture of marine instrumentation. California's marine transportation economy is also a key contributor to the national economy, providing points of entry and exit for inland U.S. industries to import and export goods and resources globally.

Second, the industry of collecting and delivering environmental intelligence to the public supports the blue economy in its own right. A recent study by the NOAA-led U.S. Integrated Ocean Observing System (IOOS®), in partnership with the Maritime Alliance and ERISS Corporation, issued the first national-level assessment of the scale and scope of the "ocean enterprise." The study shows that the ocean enterprise -- the 400- plus for-profit and not-for-profit firms that support ocean measurement, observation, and forecasting -- accounts for $7 billion of the U.S. economy annually and provides up to 30,000 jobs. An important industry cluster, the ocean enterprise focuses both on advancing ocean observing technologies and delivering value-added products from ocean data. We are looking at how NOAA can collaborate even more effectively with the ocean enterprise to develop tools and services that improve public safety, enhance our economy, and deliver environmental benefits.

National Charting Plan

Two major shifts are underway that are changing the paradigm of how NOAA produces and delivers nautical charts. First, Coast Survey has nearly completed the transition to a new charting system that uses one central database to produce all NOAA chart products. This system speeds new data and updates to all chart versions of the same charted areas and removes inconsistencies. We will complete this transition in time for the International Maritime

Organization's 2018 requirement to carry Electronic Navigational Charts as the primary chart on the bridge of large international commercial vessels. Second, since NOAA privatized all chart printing and transitioned to full print-on-demand in 2014, we can now support faster digital updates that are synchronized across all products rather than the delayed publications made necessary by the old paper chart system. Our charts can now reflect real world features that change monthly, such as updating an ocean inlet changed by winter storms in time for the summer boating season.

These changes also allow us to be more responsive to changing public needs for navigation data. In this context, Coast Survey has begun work on a National Charting Plan to outline the next steps for further improvement to NOAA's nautical charting services over the next generation. As part of this plan, NOAA will identify areas needing more detailed chart coverage, and reorganize our electronic charts to provide seamless electronic coverage for our coasts and Great Lakes. In order to aggregate the highest quality data to build new charts, we will first assess currently available data, including traditional hydrographic surveys and topo-bathymetric lidar data from our partners such as the USACE, U.S. Geological Survey, state and local groups, and other nontraditional sources. We will prioritize new data acquisition based on reported chart discrepancies, new traffic patterns, and coastal changeability. New techniques using satellite imagery to estimate water depth and crowdsourced depth data from volunteer boats will allow us to more efficiently target our survey resources to areas that will have the most impact.

For our core navigation users, we are planning a suite-wide update of our ENCs in order to optimize them for use in electronic navigation systems. We will re-examine the depth areas we digitized originally from paper charts to ensure they run across the full dataset rather than end at their former paper chart boundaries. We intend to re-scheme the entire ENC suite with an aim to reduce our number of scales from over 100 that existed in the corresponding paper charts to about 10. The digital environment allows for larger scale (more detailed) data and uniform scales and data will make the suite easier to manage, plan for, and most importantly - far easier to derive additional digital products from.

In addition to the re-scheming, we are working with the U.S. Coast Guard on the feasibility to access its Aids to Navigation database directly using specialized, semi-automated tools to make the changes to the chart based on the changes in the Coast Guard database. Similarly, we are working with the USACE to consolidate their channel condition surveys nationwide into a geo-database that is compatible with NOAA's charting system. Vector-to-vector tools will be able to automatically populate the charted channel information.

While more accurate and rapid chart updates are very important, we are seeking to do more than putting our ENCs, tide tables, current measurements, marine radio forecasts, and the latest hydrodynamic models up on a website. We are working to distribute these data in standard formats to charting systems, portable pilot units and port information systems to allow users to quantifiably manage navigation risk. As the U.S. representative to the International Hydrographic Organization, NOAA's Coast Survey is leading international efforts to develop new standards to ensure navigation data is interoperable with other kinds of geospatial data and

can be ingested easily into the user's decision tool of choice, whether that be an under keel clearance system or an iPhone.

In the era of Google Maps, there is no longer a need to procure a new edition paper map or nautical chart. Whether on the road or on the water, users are increasingly using digital services and expect maps (now often referred to as Geographic Information Systems or GIS) to be seamless and continually updated. These digital products have no pages or edges and are useful at a wide scale range. While we have a ways to go, we are taking steps toward this next generation of charting services.

The National Charting Plan, as outlined above, is responsive to years of formal and informal feedback on our products from the public and our partners. We are committed to ensuring that our plans incorporate the best thinking and the considered requirements of our stakeholders; the development of this National Charting Plan will include a period for public review and comment.

Precision Navigation

Nautical charts are not used alone. Navigation services also includes dynamic and real time environmental information from across NOAA and marine safety information from the USCG. These observations, forecasts and underlying foundational data help mariners anticipate ocean and weather conditions that affect navigation. This is particularly critical in the tightly constrained waterway between the entrance buoys to a port, through tight channels to the berth. Where a ship at sea might feel that another ship or hazard is "close" when it is closer than half a mile, ships must routinely enter and leave ports with mere feet to spare under keel, to the sides, and overhead.

While ENCs, tides and currents, weather, and salinity have been broadly available in many ports, these data are provided separately. I once visited the director of a marine exchange, and asked him how he got all the information that he needed to determine the safe window of passage for an inbound heavily loaded tanker. He showed me his iPhone, which had two whole screens of shortcuts, most to NOAA web sites, including the Physical Oceanographic Real Time System (PORTS). Even though he had access to a state-of-the-art waterway management system, none of these data streams were integrated into his common operating picture. The same is true of most at-sea navigation systems.

We envision commercial "precision navigation" systems that are well integrated with observational and geospatial information - much of it acquired by NOAA, but also through other channels - to allow mariners to navigate in constrained waterways. NOAA is working towards achieving this by modernizing and integrating the navigational information and tools ship operators, port managers, pilots, and shipping companies need, providing them through a unified delivery system across the nation, and progressively working with individual ports to augment the standard data NOAA provides with tailored products and information that address unique local challenges. The significance of precision navigation is increasingly growing as vessel sizes

and cargo volumes are already outpacing the capacities and physical and information infrastructure of some U.S. ports.

Unlike existing paper and digital charts, we are prototyping new high-resolution charts for ports that provide the level of detail needed to optimize the management of risk/return in ship movements from the sea buoy to the berth. Working with commercial partners, these hi-res ENCs will support integration with real-time observations and rapid model forecasts to allow mariners to sail using dynamic depths representing the safe depth of water at the actual time of transit under the bottom of the vessel.

The Port of Long Beach provides a tangible example of the potential benefits. By using its new underkeel clearance decision support system that is fueled by several kinds of NOAA data, the port will save an estimated $10M per year by eliminating the need to offload cargo from vessels offshore before they enter the port. This effort leveraged partnerships and capabilities of the port, pilots, private sector, Southern California Coastal Ocean Observing System, and USACE, as well as local National Weather Service modeling and model validation support. It is a model for future collaborations in other seaports, where NOAA can work with others to address challenging navigation safety margins by integrating high resolution data and products, and where feasible, leverage private investment.

We are also working with industry partners and app developers for mobile devices to deliver data in a unified, intuitive fashion to the mariner. This will provide mariners with accurate, real-time information that is simultaneously collected, integrated, analyzed, and delivered electronically to the user in a harmonized fashion to ensure their safety, the security of their vessel, and the protection of the marine environment.

Data Acquisition - Getting the Data We Need

For the past two decades, NOAA's hydrographic program has been focused on achieving full bottom coverage in an area of 43,000 square nautical miles that we referred to as the "critical area." This area was identified as needing high level survey attention because of the risk of deep draft ships hitting uncharted rocks, wrecks, and seafloor obstructions that were undetectable by previous survey technologies. This area was in approaches to major ports, coastal waterways and estuaries, and in specific areas of coastal Alaska. High resolution multibeam surveys done in these areas now and into the future will ensure they still meet the accuracies needed for this purpose.

As we continue to survey these critical areas, we are also becoming increasingly aware of the need for updated hydrographic data in coastal areas frequented by smaller commercial, fishing, charter and recreational vessels. There are over two thousand instances where we have charted an estimated depth reported by the public. In many cases these reports are made after a vessel grounding or a near miss. Thousands of charted wrecks and obstructions are in estimated positions, which can be in error by up to a half mile or more. Surveying such discrete areas

where there are known needs for data will yield a large impact per unit of survey effort, but not produce impressive total square nautical miles figures--the productivity of this part of the hydrographic program will have to be measured in different ways.

The ability and capacity to perform hydrographic surveys is a core mission for Coast Survey. NOAA maintains mapping services to meet its statutory core mission requirements and continually builds expertise that is critical to overseeing activities like contracting for hydrographic and shoreline mapping surveys. In the 1960s, we had 14 vessels in the hydrographic fleet. Today, NOAA currently owns and operates four ships (two on each coast) that are dedicated to conducting hydrographic surveys: *Fairweather, Rainier, Thomas Jefferson, and Ferdinand R. Hassler.*

NOAA is working to ensure the Nation has a fleet of research ships that meet the Nation's observation requirements. Coast Survey is engaged with the NOAA planning efforts to identify and refine the requirements for replacement vessels. Concurrent with data collection, NOAA ensures that its hydrographic surveying personnel consisting of NOAA Corps Officers, physical scientists, cartographers, GIS specialists, and others maintain sufficient expertise to oversee contracts, develop specifications, interact with international hydrographic organizations, and interface with other government agencies and private contractors to conduct all hydrographic survey work and manage the nation's surveying and charting program.

To complement and extend the capacity of NOAA's survey operations, NOAA contracts for about half of its survey requirements. The contractors we use have solid experience doing surveys to our standards, and consistently deliver high quality work. In addition, they join our government hydrographers in a vibrant US community of practice that often leads the world in use of new technology and techniques.

Leveraging Other Sources of Data

We continue to improve the efficiency of our work using emerging sources of data beyond the more traditional ones. For example, NOAA recently operationalized its airborne topographic-bathymetric lidar program, which provides improved elevation data, both above and below the shoreline, particularly in areas of less than four meters of water. NOAA coordinates its lidar work with the USACE, which also acquires topographic-bathymetric lidar in coastal areas for sediment transport management and beach engineering. Use of this technology for charting has been made possible by VDatum, a NOAA tool allowing agencies to shift seamlessly between land- and tidal-based datums.

Satellite derived bathymetry (SDB) is being explored as a method for determining chart adequacy and, in some cases, for updating charts. This technique uses satellite images to estimate depths in relatively shallow and clear waters. While estimates from SDB are not reliable enough to be the sole source for charted depths, they provide a clear indication of bathymetric change and identifying shoals. We are adapting our planning process to use SDB to target more effective use of survey resources.

In response to stakeholders who requested NOAA's charting assistance, NOAA's Office of Coast Survey decided to create some prototype ENCs using only satellite data and issued provisional charts for barge operators and others traversing Alaska's challenging Yukon River. The Yukon was literally uncharted and these new provisional charts will help to address the concerns of the local barge industry that supply goods and services to western Alaska and have had to deal with a lack of data inshore of the 12-foot contour. The new Yukon River provisional ENCs offer 1:90,000 scale coverage that spans the entrance to the Yukon River, including Apoon Pass to Kotlik, and continues east to Russian Mission. Since the river is in a constant state of change, Coast Survey will use satellite images after the spring thaws to make annual updates.

Applying hydrographic data from private sector sources is not new for Coast Survey. Private interactive cruising guides and other internet-based enterprises have set up services that allow commercial mariners and recreational boaters to share information about navigation hazards they see (or experience) while on the water. Through a no cost agreement with a private company, Coast Survey has access to these crowd-sourced discrepancy reports. Now we have taken it a step further by extending the traditional GEBCO track line database hosted at NOAA's National Centers for Environmental Information in Boulder, CO, to be compatible with commercial navigation systems already installed on tens of thousands of boats in the US and around the world. This has the potential to help us to more quickly identify changes in our waterways, and to validate reports of discrepancies. The United States Power Squadrons and the U.S. Coast Guard Auxiliary also have a decades-long tradition of sharing updates through our cooperative charting programs.

Interagency and International Partnerships

Nationally, the three agencies present today coordinate through the U.S. Committee on the Marine Transportation System (CMTS). Like the USACE and the USCG, NOAA is a charter member of the CMTS. Through the CMTS and its network of teams and working groups, we share information, seek synergies, and, where possible, integrate our related marine transportation services. As a result, issues including Arctic marine transportation, the future of navigation, resilience, development of marine transportation performance measures, and infrastructure investment are addressed in a unique federal government system-wide approach, setting the stage for interagency collaboration and efficiencies.

Locally, NOAA works with its partners in the Coast Guard and USACE throughout the nation's coastal regions. In Savannah, for example, the Coast Guard Captain of the Port requested a hydrographic survey to aid their investigation into the July 15, 2014, grounding of the casino vessel P/V Escapade, which struck a shoal with 123 passengers aboard. Coast Survey had last surveyed the area in 2005, and initial indications were that a charted shoal may have shifted westward. After surveying the area surrounding the shoal, which had in fact shifted westward, NOAA's Southeast Navigation Response Team issued a "danger to navigation" report that the Coast Guard used to warn vessel traffic until the charts could be updated. Less than one month after the grounding incident, Coast Survey cartographers used data from the survey to update the nautical chart. During the months following the incident, NOAA's Southeast Navigation

Manager toured the Coast Guard offices in several regions to train personnel on how to submit information on shoaling discovered during buoy inspections. This is an example of how our existing relationships with our sister federal agencies allow us to quickly turn a single situation into a nationwide solution moving forward.

We moved beyond the idea of one-use data acquisition several years ago under the Ocean and Coastal Mapping Integration Act of 2009, and have built on relationships and interoperability to maximize the societal value of government seafloor mapping efforts. As the pool of available data grows, we are finding an increasing amount of survey data that was collected by others that is relevant and suitable for chart application. NOAA's integrated ocean and coastal mapping program (IOCM) plans, acquires, documents, manages, integrates, and disseminates such data and derivative products in a manner that facilitates access to and use by the greatest range of users. NOAA embodies these practices throughout its mapping programs with the philosophy of "map once, use many times."

The Interagency Working Group on Ocean and Coastal Mapping (IWG-OCM) coordinates member organizations' collection of mapping data (including but not limited to hydrographic survey data) and integration of additional requirements into mapping projects with specific primary purposes. NOAA co-chairs this team with the USACE and U.S. Geological Survey. Both the NOAA IOCM team and the IWG-OCM work to be inclusive of states, localities, academia, and the private sector in their coordination efforts.

In June of this year, I attended an international Forum on the Future of Ocean Floor Mapping hosted by the Nippon Foundation, on behalf of GEBCO, the General Bathymetric Chart of the Ocean. This group of prominent international scientists, leaders, and stakeholders outlined the ambitious goal to map the world's oceans by 2030. I have since joined other leaders in US ocean mapping to discuss achieving this goal for U.S. waters. This would be a large interdisciplinary project, with benefits for navigation, fisheries management, ocean exploration, offshore energy, oceanography, and the blue economy in general. I am committed to ensure that all future surveys collected for the hydrographic program are open, interoperable, and collected to interdisciplinary, international standards in order to be consistent with this vision.

NOAA's Partnerships with Industry

NOAA's partnerships with industry are critical to our understanding of marketplace needs. The U.S. currently has a thriving marine navigation systems marketplace, made possible in part by readily available NOAA charts and commercial charts derived from NOAA charts. This market serves all types of vessels, from small open boats to supertankers. In addition, NOAA charts, in the form of web services, feed a wide variety of web mapping applications across the government, non-profit, and academic sectors. In recent years, a number of the larger manufacturers have switched to NOAA raster charts themselves. These navigation systems include applications for tablets and mobile devices. At last count, there were over 60 mobile apps – as well as web mapping applications. These products increasingly use "tile" services to update their data. We addressed this emerging need by providing a service to the application

manufacturers and the end users that ensures both ease of access and up-to-date chart products. These tile sets are updated weekly with the latest Notice to Mariners, as well as any other changes to the charts that are made that week. NOAA's chart tile service will dramatically reduce the bandwidth requirements necessary to keep a vessel's chart suite up-to-date.

These types of commercial products are a critical part of NOAA's distribution system, and supports our mission to get up-to-date charts onto every vessel. Commercial involvement in distribution allows us to focus our efforts on updating charts with new information quickly, and to seek out the best available information to resolve charted discrepancies. To stay continually engaged with industry and improve and advance NOAA's navigation products and services, NOAA relies on its federal advisory committee, the Hydrographic Services Review Panel, which is composed of a diverse field of experts in hydrographic surveying, vessel pilotage, port administration, tides and currents, geodesy, recreational boating, marine transportation, and academia. Member guidance helps shape and define NOAA and industry roles in delivering beneficial products and services for successful navigation systems of the future.

Aligning Arctic Plans with Traffic Patterns

The Arctic provides a good example of new technologies and partnerships at work. We are prioritizing needs and focusing on areas with increasing traffic and special requirements as we expand charting in the Arctic.

NOAA continues to work with partners like the U.S. Coast Guard and local vessel pilots to assess nautical charting requirements and prioritize surveys of likely shipping lanes in the North Bering and Chukchi Seas and address the Bering Strait chokepoint in particular. More broadly we are looking at how to reduce the risk of accident and environmental impact in Arctic waters. In 2015, NOAA, and the Coast Guard worked together to collect trackline survey data as several ships passed north and south along this route. NOAA will continue to work with the U.S. Coast Guard and other agencies as they identify additional gaps where NOAA can leverage outside public and private data collection platforms to achieve full coverage of these areas.

The Arctic region poses unique operational challenges for hydrographic surveying, such as in predicting future ice conditions, planning surveys in advance, and conducting those surveys under harsh environmental circumstances. NOAA and its contractors are assessing safe and accurate approaches to Arctic data collection, as well as evaluating the technology and strategies needed for long-term monitoring of tides, water levels, and currents under harsh Arctic conditions. Putting good information into the hands of mariners is essential for safe navigation and environmental protection, and coastal communities and scientists must have the same foundational support for good operational and research decisions. NOAA's hydrographic services are an essential component of an open Arctic where conservation, management, and use are based on sound science to support U.S. economic growth and resilient and viable ecosystems and communities.

This summer, NOAA plans to acquire 275 square nautical miles (SNM) of Arctic hydrographic survey data in the Etolin Strait east of Nunivak Island and off the North Coast of Unalaska Island. In addition, the NOAA ship *Fairweather* will conduct a fisheries habitat survey in Bristol Bay to optimize data quality for habitat mapping; any usable hydrographic survey data that meets NOAA charting requirements will be applied to nautical charts. NOAA will install, maintain, and process data from six short-term water level stations and will use data collected from three long-term National Water Level Observation Network stations to support these surveys.

Conclusion

NOAA plays a unique and important role by providing critical information infrastructure to support safe, reliable, and efficient navigation and maritime commerce. Thank you for the opportunity to discuss some of those efforts with you. We would welcome the opportunity to provide the Committee with greater detail on any of NOAA's navigation and infrastructure related services.

Joint Hearing on the "Federal Maritime Navigation Programs: Interagency Cooperation and Technological Change"
Subcommittee on Coast Guard and Maritime Transportation
Wednesday, September 7, 2016
2167 Rayburn House Office Building
Washington, DC

September 16, 2016

Submitted on behalf of Congressman John Garamendi (CA-03):

Questions for the Record to NOAA:

Arctic transit routes continue to grow in importance due to increased vessel traffic in the region as well as expanding exploration efforts brought on by international interests in the oil, gas and mineral deposits of the area. This increased activity necessitates a more complete understanding of the region and seafloor through more efficient data gathering techniques than ones currently employed, such as shoaling.

Q: What requirements must be met in order to advance the data collection methods employed in charting the Arctic seafloor?

A: **Requirements to Meet Arctic Surveying and Charting Gaps**

Because the U.S. Arctic has been relatively inaccessible until recently, it lacks the same basic geospatial infrastructure NOAA has provided to the rest of the Nation. Very few Continuously Operating Reference Stations (CORS) and National Water Level Observation Network (NWLON) stations currently serve the Alaskan Arctic. Co-locating new CORS and NWLON stations would significantly improve the extremely limited coverage in northern and western Alaska, and expand the Arctic geospatial network.

To address Arctic surveying and charting gaps, NOAA has prioritized its hydrographic survey work in the Arctic into three phases.

1) Survey to support current traffic patterns, including commercial fishing, community resupply, and transient traffic through the Northwest Passage. The critical areas for these purposes are harbors, landings, passages, harbors of refuge and corridors.
2) Response to changes in patterns of vessel traffic. As the Arctic becomes more accessible, new areas will become important for navigation, and NOAA will respond to these changes in use or planned use by continually refining its Arctic charting strategy
3) Systematic interdisciplinary surveys. Navigation is just one use of seafloor mapping. Fisheries management, habitat protection, and resource exploitation all require detailed seafloor maps. Surveys outside of the core navigation requirements of 1 and 2 will be conducted and prioritized to maximize the interdisciplinary value of the surveys.

To complement surveys by government ships, NOAA contracts for hydrographic surveys in the Arctic at a value of approximately $6M per year. In order to ensure survey requirements for accuracy are met, NOAA verifies the accuracy of all contract and government surveys, and incorporates this data into nautical charts.

To ensure international Arctic charting efforts are coordinated, NOAA participates in the committees and working groups of the International Hydrographic Organization (IHO) as a full member, bringing the U.S. perspective to the development of IHO standards. Those standards guide development of NOAA's hydrographic and cartographic specifications used in the Arctic.

NOAA supplements hydrographic surveys with satellite data, crowdsourced trackline depth data, and multi-beam data from other sources. While this data does not typically meet modern hydrographic standards, it can be used to improve charts and focus survey priorities on areas where changes have developed or hazards have been discovered. The integration of data into charts is a core function that ensures that NOAA navigational charts are authoritative and include the best available data. Although the quality of available charting data has increased, the quantity of this data has increased as well, challenging NOAA to sustain the cartographic expertise needed to validate and integrate critical data into charts on a useful timescale.

NOAA's charts of many Arctic areas are neither detailed enough to meet current navigational needs nor depict the level of detail that could be supported by available data. NOAA has published an update to the Arctic charting plan that identifies an additional 11 charts that would support current use patterns.

NOAA would welcome an opportunity to further discuss Arctic charting requirements with the committee or with individual members at their invitation.

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS

COMPLETE STATEMENT OF

MR. EDWARD E. BELK, JR PE
CHIEF, OPERATIONS AND REGULATORY DIVISION

BEFORE THE

COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE

SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION

AND

SUBCOMMITTEE ON WATER RESOURCES AND ENVIRONMENT

UNITED STATES HOUSE OF REPRESENTATIVES

ON

"Federal Maritime Navigation Programs: Interagency Cooperation and Technological Change"

SEPTEMBER 7, 2016

Chairman Hunter, Chairman Gibbs and distinguished members of the Subcommittees, I am Eddie Belk, Chief of the Operations and Regulatory Division for the U.S. Army Corps of Engineers (Corps). I am honored to appear before you today to discuss the issues associated with Federal Maritime Navigation Programs, with an emphasis on Interagency Cooperation and Technological Change.

The Corps works in partnership with Federal agencies, particularly the United States Coast Guard and National Oceanic and Atmospheric Administration (NOAA), along with local, regional, and national stakeholders.

This fiscal year (FY), the Corps is investing just over $2.6 billion appropriated by Congress, to study, design, construct, operate and maintain its national navigation infrastructure, including channel deepening projects to accommodate Post-Panamax vessels and recapitalizing locks and dams to increase reliability and efficiency on our inland waterways. This represents almost 45% of the entire Corps Civil Works appropriation for FY 2016 and includes approximately $1.25 billion from the Harbor Maintenance Trust Fund and $108 million from the Inland Waterways Trust Fund. The Corps navigation mission area supports over 1,000 coastal ports with 13,000 miles of coastal navigation channels; a large portfolio of inland waterways with 12,000 miles of channels; 241 navigation locks at 197 sites nationally; and over 900 breakwaters, jetties and other navigation structures.

Over the past decade or so, the Corps has experienced meaningful improvement in the data we collect, create, and use to operate and manage Corps maritime assets. We have contributed to and benefited from this same trend across the broader marine transportation community. No matter what the waterways of the future may look like, there is no doubt in my mind that managing them will require creating, managing, analyzing, and sharing more data and information than ever before, whether across partner agencies or with waterway users. That is why we have focused much of our research and technological innovation in this area.

Over the past several years, the Corps has developed data frameworks and strategies to maximize data value by converting raw data into usable information and knowledge. Our philosophy is to collect data once and then use it many times by making it broadly available, both across the Corps and to others. E-Navigation is about harmonizing data and information across all stakeholders, whether public or private. Our efforts in this area are in alignment with the e-Navigation concept as defined by the International Maritime Organization and documented in the US Committee on the Marine Transportation System "e-Navigation Strategic Action Plan." The Corps interagency e-Navigation efforts directly contribute to improved safety, efficiency and reliability of the national maritime channels, harbors, and waterways.

The Corps is successfully applying e-Navigation capabilities today, with more on the way, through ongoing research and development programs. The Corps is the United States nautical charting authority for inland waterways. For the past decade, the Corps has created over 7,200 miles of detailed inland electronic navigational charts. Since 2013, over six million of our charts and chart updates have been downloaded by mariners, providing the most up to date information for safely navigating on our rivers. Additionally, through the use of Automatic Identification System (AIS) vessel tracking technologies, electronic data communications, and "virtual" Aids to Navigation, our waterways are made safer and more efficient for navigation.

The Corps is responsible for surveying all Federal channels, harbors, and waterways in order to report channel conditions to our partners and stakeholders. This is accomplished with both in-house resources and with resources contracted from the private sector. This past year, the Corps deployed our eHydro tool across all Corps coastal offices, which takes hydrographic surveys of latest navigation channel conditions and then standardizes the data for use in enterprise tools. This improves our ability to create and disseminate more consistent products from standard surveys more quickly. A few example products include automatic development of channel condition reports that we provide to NOAA for their use in nautical charting of coastal waters and standardized GIS maps for use by waterway operators and the public. The eHydro tool is being expanded on the inland waterways with applications that create inland survey overlays for Coast Guard use to improve the accuracy and efficiency of setting physical buoys on our rivers.

Several years ago, the Corps created an e-Navigation tool that combines the information from our inland electronic charts with the marine vessel AIS. The result was our Lock Operations Management Application, or LOMA, which uses real-time vessel tracking data from AIS to provide our lock operators with visibility on the movement of commercial vessels along the inland waterways. LOMA was deliberately designed to be interoperable with the Coast Guard Nationwide AIS system, using common architecture and software to manage the millions of daily AIS data messages. The data from over 130 LOMA-installed AIS hardware sites on the inland waterways are shared with the U.S. Coast Guard Nationwide AIS system, providing real-time visibility on inland waterways. The Coast Guard provides additional system monitoring and data archive services, allowing access by researchers and planners in the Corps to valuable high-resolution historical vessel movement data that allows us to better target limited infrastructure investments. Building LOMA in partnership with the Coast Guard has saved the Corps time and significantly reduced the risk of developing a new system. The Corps and the Coast Guard continue to work in partnership to improve the system and make the most of these shared capabilities.

In addition to providing both agencies with real time waterway situational awareness through AIS data received from maritime vessels, LOMA also

transmits information directly to vessel captains via AIS. LOMA is currently transmitting real-time water levels, river currents, weather observations, and lock queue information to vessels in the area of a joint Coast Guard-Corps test bed on the lower Ohio River. This year we are testing electronic notifications of work areas where floating plant may obstruct portions of the waterway. This directly addresses a recent National Transportation Safety Board recommendation from an incident where a vessel collided with Corps floating plant performing critical channel maintenance work near a blind bend on the Mississippi River. There were no serious injuries associated with that incident.

Other capabilities being tested include the transmission of information on physical Aids to Navigation that augment those aids. Also, for the first time on US inland waterways, the Corps, working closely with the Coast Guard, transmitted a "virtual" Aid to Navigation to mark a sunken vessel when the establishment of a physical buoy was not possible due to environmental conditions. Additional capabilities include transmitting water current velocities derived from Corps-developed numerical models to towboat operators as they approach lock structures so they are situationally aware of unexpected adverse conditions at lock entrances. We believe transmitting such information will help increase lock reliability and improve mariner safety by reducing allisions that can damage or close our locks.

Longer term, we are working with NOAA, the US Coast Guard, the National Geospatial Intelligence Agency, and other federal providers of navigation information to create an integrated marine safety information service for all waters of interest to U.S. mariners. This will provide commercial mariners and the public with common access to marine safety information that is tailored for their specific needs, available in formats usable by their equipment or systems. This Enhanced Marine Safety Information, or eMSI service, is in the proof of concept stage as we identify data harmonization needs and ensure alignment with similar international efforts.

The Corps has an extensive portfolio of data and information capabilities and products, with plans for more. We are working well with other Federal agencies through the U.S. Committee on the Marine Transportation System and with other public and private stakeholders to create waterways of the future that link information and provide it to mariners and operators to improve safety, efficiency, and reliability.

In closing, the Corps is actively engaged with partner agencies and maritime users to accelerate the development and deployment of technological enablers for the mariner by harmonizing data through e-Navigation principles. We are committed to improving our use of data from other agencies and waterway stakeholders, and to making our data and information available for others to use.

This concludes my statement. Again, I appreciate the opportunity to testify today. I would be pleased to answer any questions you may have.

Statement for the Record by
Edward Saade, President, Fugro (USA) Inc.

House Transportation and Infrastructure
Subcommittees on Coast Guard and Maritime Transportation and
Water Resources and Environment

Hearing on Federal Maritime Navigation Programs:
Interagency Cooperation and Technological Change

September 19, 2016

I want to thank the Subcommittee for this opportunity to provide a statement for the record on the subject of Federal Maritime Navigation Programs: Interagency Cooperation and Technological Change. My name is Edward Saade, President of Fugro (USA) Inc., based in Houston, Texas with 37 offices in 13 states across the USA. Fugro provides world class geotechnical, survey, subsea and geosciences services to the public and private sectors, with a recognized expertise in the area of hydrographic survey work.

My background includes 40+ years of Hydrographic, Coastal Zone Management, Geospatial Survey and Ocean Engineering experience. Since 2014, I have been serving as Americas Regional Director for the Fugro Survey Division, and was promoted to the President of Fugro (USA) Inc. in June 2015, continuing to serve Fugro in both capacities. My responsibilities include the management of the largest Region within Fugro's Marine Division, overseeing a staff of 1200 with an annual budget in excess of $250M, operating across multiple countries around the America's region with several offices in the USA. During this time, I have overseen the expansion of Fugro's capabilities to become the world leader in hydrographic LiDAR, multi-beam and backscatter data acquisition and mapping techniques for charting, and Coastal Zone and Essential Fish Habitats analysis. These techniques have been directly applied to the offshore oil and gas and construction industries and a wide variety of national hydrographic offices, including NOAA, CHS (Canada), GCS (Kingdom of Saudi Arabia), RAN (Australia) and SHOM (France). As of March of this year, I am a member of the Hydrographic Services Review Panel.

Fugro is the world's largest multi-national survey and geotech company, whose primary mission is to map the earth's surface. In the past 24 months this has included the collection of more than 1,000,000 square kilometers of high resolution seafloor charting data in shallow and deep water regions throughout the world. Our United States-based personnel from the offices referenced above have been directly involved in all of these global mapping programs, which include the ongoing Malaysia Airlines MH370 search program, the recently-completed world's largest hydrographic charting project located in the Red Sea, and the currently-running program for the world's largest deep water mapping project in deep water Gulf of Mexico (USA and Mexico). For more than 20 years, we have successfully provided survey backlog contract support to National Oceans and Atmospheric Administration (NOAA) and nine other hydrographic offices around the world.

Fugro has been a contractor for NOAA, National Ocean Service (NOS), and Office of Coast Survey (OCS) backlog support since the mid-1990s, and I have been involved with this work for more than 18 years. Our offices in Alaska, California, Texas, Louisiana, Mississippi, and Maryland directly support our multiple NOAA contracts for mapping services nationwide. I am a firm supporter of the NOAA NOS OCS Backlog process. For purposes of this hearing record, I wish to identify a portion of the success story associated with this process that rarely is mentioned or acknowledged. Specifically, I wish to bring attention to the

positive financial impact of NOAA-initiated technology transfer and innovation to both USA industries and global activities.

Fugro is an industrial partner with the University of New Hampshire Center for Coastal and Ocean Mapping Joint Hydrographic Center (UNH CCOM JHC). The NOAA Charting Backlog program, along with its industry partners and various R&D/Innovation initiatives at UNH CCOM JHC, have combined to be the leading technologies creators, developing Multibeam Echo Sounder (MBES) and related applications and improvements that have ultimately been adopted and applied, and which have extensively benefitted industry applications. Since the early 2000s a small sampling list of such applications includes TrueHeave™, MBES Snippets and Geocoder. This small sampling of applications integrated, into various seabed mapping industries in the United States alone, directly benefits more than $200 million of mapping services annually. More recently, the most significant groundbreaking technology discovery is based on the combination of MBES bathymetry, backscatter, and water column collection/detection applications. Initial applications were for a variety of reasons and disciplines, mostly scientific in nature as led by UNH CCOM JHC. These capabilities were quickly recognized by industry experts as new technologies with a variety of applications in the ocean mapping industry, including fisheries, aggregate materials surveys, various engineering design studies, and oil and gas exploration applications.

An initial cost-benefit analysis of the impact in just the oil and gas exploration industry yields the following findings:

- Detection of Seabed Seeps of Hydrocarbons: During the past decade, the utilization of MBES for bathymetry, backscatter, and water column mapping has been directly applied to the detection, precise location, and analysis of seabed gas and oil seeps, mostly in deep water hydrocarbon basins and frontier areas. This scientific application of the methods discovered and perfected under the leadership of NOAA NOS OCS and the CCOMJHC has been embraced and applied by companies and projects in the United States specifically to aide in the successful exploration and development of oil and gas reserves in water depths exceeding 10,000 feet. These studies provide a service to find seeps, evaluate the seeps chemistry, and determine if the seeps are associated with significant reservoir potential in the area of interest. This information is especially useful as a means to "de-risk" the wildcat well approach and ensure a greater possibility of success. It should be noted that many of the early terrestrial fields used oil seeps and geochemistry to help find the commercial payoffs. This was the original method of finding oil globally in the first half of the 20th century onshore and along the coastline. Estimates run into the millions of barrels (billions of dollars) of oil directly related to, and confirmed by, the modern MBES based seep hunting methodology.

- It is estimated that the current USA-based annual revenue directly related to operating this mapping technology is $70 million per year. Note that this high level of activity continues today, despite the current extreme downturn in the offshore oil and gas industry. The seeps-related industry is expected to grow at an annualized rate of 25% per year. Globally, this value projects to be nearly double, or approximately $130 million per year.

- There are other current and potential uses of these data related to environmental aspects.

- BP had to repeatedly demonstrate that oil slicks in the vicinity of the Macondo disaster were natural in origin, and this was done by geochemical analysis of the samples. The MBES-based mapping process can directly aid in this type of forensic analysis.

- Recent large-scale seeps studies are identifying hundreds of naturally occurring seeps in oceans both inside and outside of the boundaries of the United States. In some locations, this is as many as 500 active seeps per 4,000 square miles of seafloor mapped (approximately the size of Los Angeles County). What is the environmental impact of this previously unknown level of activity? How does it tie into studies of ocean acidification, methane buildup, and sea level rise?

In closing, from my perspective, it is easy to connect the dots directly from our participation and partnership with NOAA NOS OCS Charting Backlog contracting to an Industrial Partnership with UNH CCOM JHC, applying what we learned and discovered to a variety of commercial mapping. The financial benefits extend to oil and gas industry support, international charting programs, and a variety of seabed construction and monitoring projects. For Fugro alone, the associated commercial revenue exceeds a billion dollars since our initial involvement with NOAA NOS OCS. I urge the Committee to continue to include cost-benefit analyses of the NOAA NOS OCS Charting Backlog contracting and that this analysis be expanded to include the United States and global ocean mapping industry benefits that continue to expand rapidly.

Thank you again for this opportunity to comment.

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